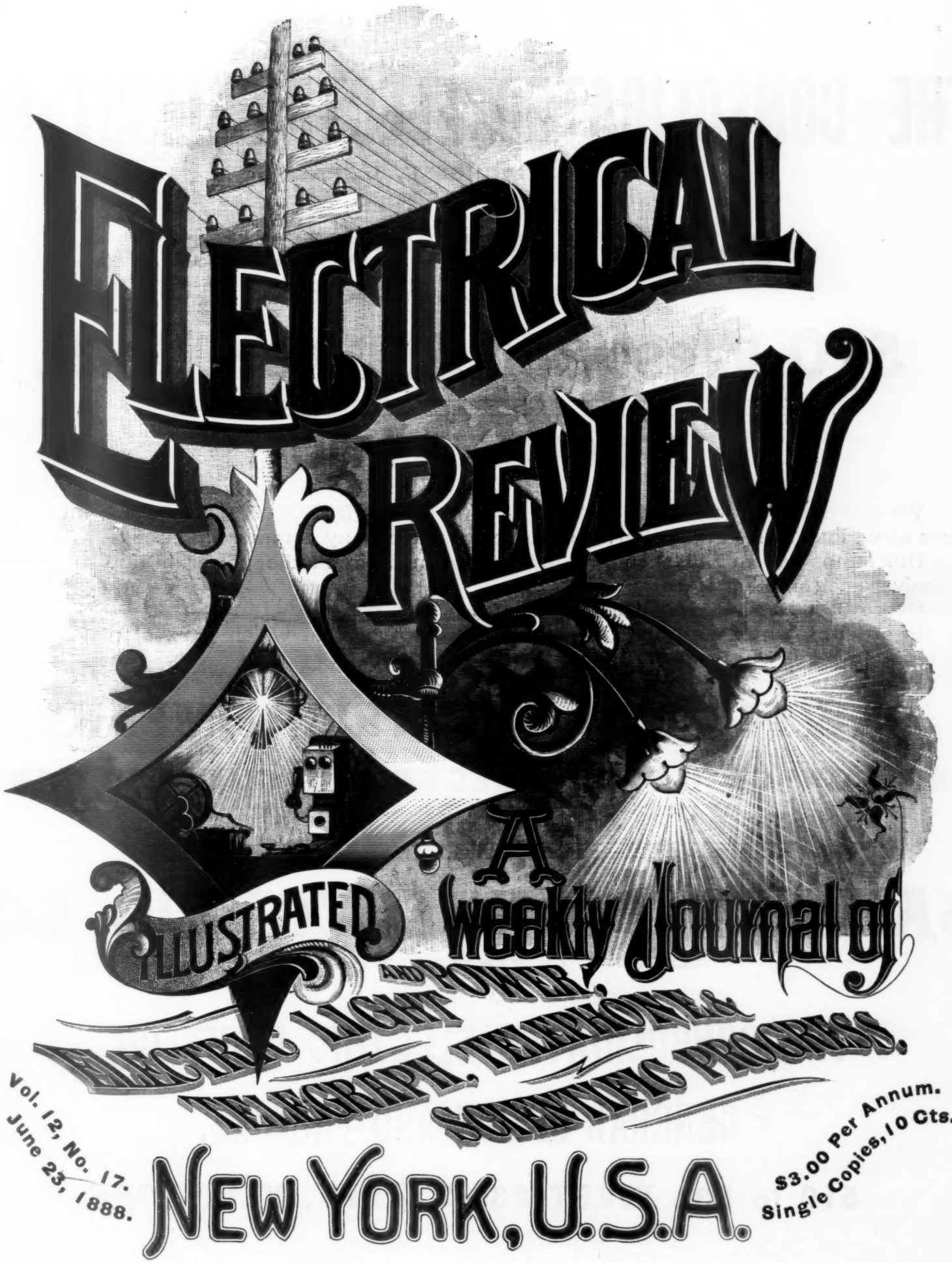


Vol. 12, No. 17.
June 23, 1888.

NEW YORK, U.S.A.

$3.00 Per Annum.
Single Copies, 10 Cts.

THE CONSOLIDATED ELECTRIC LIGHT CO.

GEORGE WESTINGHOUSE, Jr., President,

OWNERS OF THE

SAWYER-MAN PATENTS,

GENERAL OFFICE:

510 West 23d St., New York.

SPECIAL NOTICE.

New York, June, 1888.

We are prepared to furnish SAWYER-MAN INCANDESCENT LAMPS mounted in our bases of various styles and patterns, suitable for use on any commercial circuit.

Our lamps will not blacken and will maintain their candle power if not subjected to excessive electromotive force.

Over 400,000 Sawyer-Man Lamps in use.

In ordering lamps state the electromotive force (volts) at which your plant is run, and the type of socket you use.

Price Lists furnished on application.

SAWYER-MAN ELECTRIC COMPANY,

COMMERCIAL AGENTS FOR

THE CONSOLIDATED ELECTRIC LIGHT COMPANY,

510 WEST 23d STREET.

SAWYER-MAN ELECTRIC CO.

HENRY C. DAVIS, President,

COMMERCIAL AGENTS OF

THE CONSOLIDATED ELECTRIC LIGHT CO.,

GENERAL OFFICE AND FACTORY,

510 to 534 WEST 23d STREET, NEW YORK.

ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

Electric Light, Power, Telephone, Telegraph and Scientific Progress.

VOL. 12, No. 17. WEEKLY.

NEW YORK, SATURDAY, JUNE 23, 1888.

$3 per annum. Single Copies, 10 Cents.

Copyright, 1887, by ELECTRICAL REVIEW PUBLISHING COMPANY, 13 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

Electric Night Signals.

The system of signals by incandescent electric lights as recently adopted in the German and Italian navies was exhibited by Lieutenant W. H. Beehler, United States Navy, on board the United States steamer "Atlanta" at Annapolis last week during the graduating exercises.

The electric lamps are used in the three lanterns twelve feet apart, hoisted at the masthead, and the lights are displayed by means of a switch box to open and close circuit through the combination of lights to make the desired signal. The lamps are arranged in pairs, of one red and one white Edison lamp. Each of the three lanterns contains a pair of lamps and no two lamps in the same lantern are displayed at the same time.

The switch box is a brass cylinder, five inches in diameter and two inches high. Its upper surface is a dial with fourteen discs, one quarter of an inch in diameter. These discs are made of pieces of red and white glass arranged to show the same combination of signal lights displayed in the lanterns aloft. It has an index and the knob in the centre serves as a key, which, when raised, closes the circuit through the lamps aloft, corresponding to the combination covered by the index on the dial. When this knob is depressed the lights aloft are immediately extinguished. The box has terminals to the dynamo machine, and six wires with a common return wire to the Edison lamps. It also has a receptacle for a small Edison lamp in the box to illuminate the red and white glass discs on the dial to be visible at night.

The fourteen combinations possible are as follows:

White, 1.
Red, 2.
White—red, 3.
Red—white, 4.
White—white, 5.
Red—red, 6.
White—red—red, 7.
Red—white—white, 8.
White—white—red, 9.
Red—red—white, 0.
White—red—white, correct.
Red—white—red, preparatory.
White—white—white, answering.
Red—Red—red, interrogatory.

The system is readily adapted for the general naval signal book and telegraphic dictionary like the flag numerals of day signals. In order to make any signal, the message is first sought in the signal book, and the number corresponding thereto is then signalled.

For example, suppose the message, "Start fires in all boilers at three A. M.," be numbered 6,487. It would only be necessary to turn the index over 6, red—red, raise the knob and keep it up a few seconds, depress and turn the index over 4, red—white; raise the knob and keep it up a few seconds, depress and turn the index over 8, red—white—white; raise the knob and keep it up a few seconds, depress and turn the index over 7, white—red—red; raise the knob and keep it up a few seconds and depress.

Each one of the four numbers will have been displayed for a few seconds consecutively.

By using Edison's fifty candle power electric lamps the visibilty of the lights is only limited by the height of the mast, and as these lights are very brilliant they are visible at a greater distance.

Economy, health and convenience demand a plant of incandescent electric lighting on board of all war ships and passenger steamers, and this system can be used wherever there is such a plant without any expense whatever.

The search light would be better for long distances, but this requires a special dynamo, and with but one such light it would require much more time and trouble to send any message.

The signal boys on the "Richmond" and other vessels of the North Atlantic squadron were provided with the card explaining the signification of the fourteen different combinations, and they understood the messages signalled without the slightest difficulty. Long messages containing names of officers spelled out by the telegraphic dictionary were signalled and understood without error, although no one had ever heard of the system before the day of the experiment.

The fifty candle power lights were so brilliant that there was no possibility of confusion, while the red and white colors differed so radically from each other that the sender could not easily make a mistake, because the desired numeral is visible on the dial before he raises the knob to display it aloft.

The system can be readily adapted to the commercial code and the lanterns can be carried permanently aloft. It is self-evident that this system could be used by mail steamers, and if the international conference urged by the New York *Herald* and provided for by the Belmont bill should require vessels to have a signal to indicate their course, a definite combination could be kept displayed by this means which would be readily understood by the commercial code. This is the simplest, cheapest and most efficient system of night signals ever devised.

How to get rid of Electricity in Printing Presses.

A gentleman of Boston, is said to have introduced a simple method of getting rid of electricity in the press-room. He saturates the fingers or sticks of the fly with glycerine and water. This is put on with a sponge while the press is at rest. The next time it is stopped it is again wet, until finally the wood is completely saturated and there is no longer any need of repeating the process.

Dynamo with Hand Power.

Messrs. E. S. Greeley & Co., of this city, have placed upon the market what is called the young "Hercules" dynamo, which is designed especially for experimental use in laboratories, and where lighting for short periods such as in show windows, etc., is required. It can also be used for spectacular effects in theatres.

The dynamo has a pressure of 60 volts with four amperes which will enable six 16 candle-power incandescent lamps of 20 volts to be lighted to full incandescence when mechanical power is applied. Four lamps can be lighted up readily enough by a single man using hand power.

As will be seen from the illustration this dynamo is made compactly and can be readily mounted and dismounted upon a table for occasional use, the gross weight being only 23 pounds. This makes it a very desirable piece of electrical apparatus for use in schools and colleges and all places where experiments are made.

DYNAMO SHOWING HAND POWER ATTACHMENT.

Those Damp Subways.

In a recent interview, Prof. Henry Morton, of Stevens Institute, the widely known electrical expert, spoke as follows of the subways of New York. The reporter first told him that Chief Engineer Beckwith, of the Phœnix Construction Company, had admitted that the electrical conduits in New York were damp and that the companies would be wofully disappointed if they waited for a perfectly dry conduit:

"I think a moist conduit would be utterly useless for carrying wires for arc or, in some cases, even for incandescent lights. Why? Because water or moisture itself is a good conductor. The best insulating material we know of will not withstand the constant exposure to moisture and air such as would be found in a damp conduit while carrying a heavy electric current.

"These heavy currents are constantly tending to work their way through the insulation toward the moisture, which being a good conductor, develops an inductive attraction for them. The wires could not carry sufficient insulation to protect them against cross connections or leakage. If the gas with which ths streets of large cities are permeated gets into the conduits it is certain to destroy the insulating material.

"I think that if electric light wires could be placed under ground so as to have the positive and negative wires that make up the circuit in separate ducts, the danger of cross connections would be greatly diminished, but this would about double the expense and lessen their commercial value, and is, therefore, out of the question.

"To a limited extent it is possible to run electric light wires in underground conduits, but so far as I know, wherever it has been attempted, there have been constant trouble and repeated interruptions of the light as well as tearings up of the street for repairs.

"In Philadelphia they ran a mile or two of wires under the ground, but had endless trouble. When I was there last I was told that they had been forced to abandon one of their lines, and were almost constantly tearing up the streets to make repairs upon the other. Among their other experiences were several explosions, caused by the contact of gas with portions of the wire that had lost its insulation.

"I am decidedly of the opinion that no satisfactory material for the protection of underground insulation has yet been devised. Evidently the experts in England have come to the same conclusion, for the government has recently exempted the electric light companies from the operations of the Underground Act. The Parliamentary Committee, I believe, reported that proper insulation was impossible, except at an expense that would render the business of furnishing electric lights unprofitable.

"Commercially speaking, therefore, there is no known protection for insulation under the ground. Of course if you covered them with lead so thick (measuring a distance of probably nine inches) they would last for some time, but that could not be profitably done."

Tired of the Telephone.

The telephone has had a long rest from abuse, but its turn has come again.

"Have you got a telephone?" said one man in the car to another.

"Yes, and I wouldn't be without it for anything. It's the most useful, most"——

"Hold on. Got any family—small family up at your house?"

"No."

"Well. I'm going down to tell them to take mine out right away."

"Why?"

"Can't get away for it. My wife has succeeded in getting at me everywhere I've been, and I've always had to go home. I have wanted to have a quiet evening with the boys for some weeks, but every time 'ting-a-ling-a-ling'—that confounded telephone. Always some message. You see, I'm too honest. I always tell her where I'm going and she catches me every time. She has used every possible experiment a telephone could possibly carry, but she has overdone it, and no more telephone."

"What has she done?"

"Well, last night I made up my mind I'd take a holiday from the family, so to speak, and when the telephone rang I went to it prepared to face every argument she could make. But she got me—she got me. I had to go home."

"How did she get you?"

"Hang it, she put the baby up to the telephone and pinched it till it yelled blue murder over the wire."

—— Thomson-Houston Electric Company reports the following new installations: Asbury Son's Gas Works, Greenville, N. C., 18 arc; Norfolk, Va., 70 arc; Hotel St. Louis, Duluth, 650 incandescent; Menomenee, Wis., 150 incandescent; and the following increases: Paterson, N. J., 800 incandescent; Syracuse, N. Y., 1,000 incandescent; Atlantic City, N. J., 50 arc; Cheboygan, Mich., 20 arc; Crawfordsville, Ind., 30 arc; Paterson, N. J., 50 arc.

Estimates of Electrical Energy Necessary for Tram Cars.

Mr. Huber, in the London *Electrical Engineer*, estimates that the energy required to be stored in the cells in order to draw a load of one long ton, in ordinary weather, over one mile of average road, the gradients on which do not exceed 2½ per cent. on an average, is equivalent to 125 watts exerted for an hour. Calling the daily run 70 miles, and the weight of the car eight tons, it follows that the battery must be of such proportions that it can give out during the run as much energy as is equivalent to $70\times8\times125 = 70{,}000$ watts exerted for an hour. As this energy is not used during one hour, but distributed through, say, 14 hours, the battery will only need to be $\frac{1}{14}$th of 70,000 watt-power, or 5,000 watt-power. If there are 125 cells, each having an electromotive force of two volts, the electromotive force of the battery will be 250 volts, and in order that it may develop the necessary 5,000 watts it must give a current of 20 amperes, *i. e.*, $5{,}000\div250 = 20$. Ohm's law ($C = E \div R$) shows that if the current is 20 and the electromotive force 250, the total resistance must be 12.5 ohms. Most of this resistance will be in the motor, which should be designed accordingly. It takes 746 watts to equal one horse-power, so that 70,000 watts exerted for one hour is the same as $70{,}000\div746 = 93.8$ horse-power exerted for an hour. We may assume that the generator gives out 80 per cent of the indicated horse-power of the engine that drives it. The engine would therefore be large enough to be able to exert 117.2 horse-power for one hour, if it did the charging all in one hour, since 80 per cent. of 117.2 is 93.8. If the charging of the battery lasts 20 hours instead of only one hour, the engine need be only $\frac{1}{20}$th as large. That is, it will not need to exert more than 5.9 horse-power.

Electrostatic Attraction of Electrodes in Water and in Weak Solutions.

According to Maxwell, when a current passes through conductors there is free electricity not only on the outside surface of the conductors, but also on the surface boundary between two conductors of different specific resistance, since the electric force must have a different value on each side.

The experiments were made in order to ascertain if this hypothetical layer of free electricity would act in accordance with the ordinary electrostatic laws. A Thomson electro-meter is placed in the liquid so that the needle and quadrants are immersed. On connecting all four quadrants to the needle, the latter takes up a position which is considered as the arbitrary zero. One pair of quadrants and the needle are then connected to one pole of eight bichromate cells, and the other pair of quadrants to the other pole. There is immediately a considerable permanent deflection, which disappears on interrupting the circuit. The nature of the liquid has no immediate effect, though the production of gas by electrolysis interferes with the phenomenon, and therefore it is best observed in the case of distilled water, which only evolves gas after some time.

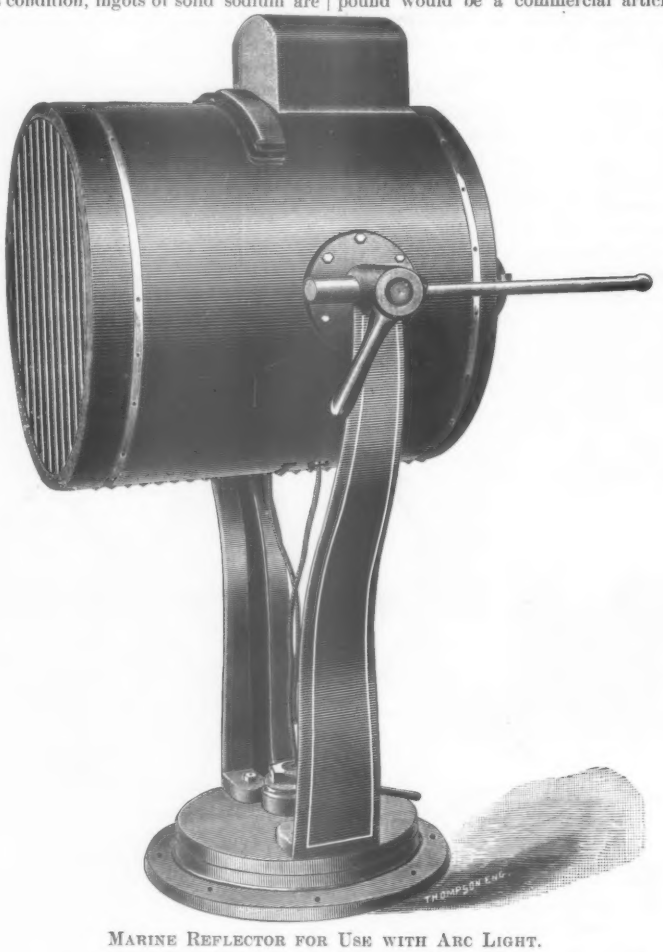
The liquids used having a very high specific resistance, the opposite quadrants are almost at the same difference of potential as the poles of the battery; and it is this constant P. D. which causes the phenomenon, and not the variable intensity of the current. The deflection does not alter on reversing the battery connections; it is inversely proportional to the distance of the needle from the quadrants; it is proportional to the square of the number of cells used; it changes its direction when the connections to the quadrants are reversed. In short, the results are quite similar to what would be obtained in the ordinary way with the electro-meter in the air instead of in a liquid. The deflections are, however, very much greater than would be obtained in air; the deflection in distilled water is about eighty times greater than in air. This ratio of the attraction in a liquid compaired with that in air is comparable with the specific inductive capacity of dielectrics.

Aluminium.

The search after cheap aluminium still continues. The various bronzes and alloys into which aluminium enters promise to possess such wonderful properties of strength and ductility, that a large market is sure to be open to the metal immediately it can be produced at a moderate cost. Therefore, inventors have the certainty of reaping a rich prize if they can only solve the problem before them. The Cowles Company have already got an electric furnace to work in this country for the production of aluminium alloys. Dr. Kleiner's process is being actively pushed, while the old Deville process has been greatly cheapened by the introduction of the Castner's method of manufacturing sodium. During the last few days, another method of manufacture, already in operation at the works of Messrs. Krupp, at Essen, has been introduced into this country by the Alliance Aluminium Company, of King's Head Yard, E. C. It is the invention of Professor Curt Netto, of Dresden, and is a chemical process, based on the displacement of aluminium from its ores by metallic sodium. The ore used is cryolite, a double fluoride of aluminium and sodium. This is ground to n fine powder, and is fluxed with common salt. The ore is then melted in a reverberatory furnace, and when quite liquid, is run into a ladle. When in this condition, ingots of solid sodium are forced to the bottom of the ladle, and are then held until they become volatilized, the work of a few moments only. The gaseous sodium rising through the molten cryolite displaces a part of the aluminium, which collects in a metallic form at the bottom of the ladle. The greater part of the slag is then skimmed off, and the remainder poured into an iron crucible to cool. When the mass is turned out, a solid ingot of aluminium is found at the bottom. The whole of the aluminium in the original charge of ore is not obtained at each operation, and the slag is therefore returned to the furnace with more cryolite. After the first charge, the addition of salt is not required, as the slag serves the purpose of a flux.

For each pound of aluminium obtained, their is required about three and one-half pounds of sodium, so that it is important that this metal should be obtained cheaply. The Alliance Company manufacture it at their works, the process, as described to us, being as follows: Pure caustic soda is melted in a pan, and then ground coke is stirred into it; 100 pounds of the mixture are ladled at a time into a long narrow retort, lying in a furnace. The carbon effects the reduction of a part of the soda, metallic sodium being distilled off and caught in a condenser, while carbonate of soda is left in the retort. When the reduction is complete the carbonate of soda is run off, and a fresh charge introduced, and so the process goes on. We were not informed what was the cost of the metal obtained, but it should not be greater than that obtained by the Castner process, which is stated to be one shilling a pound Possibly it is less.

On Monday last we saw a 5-lb. ingot produced, the time occupied from charging the furnace to weighing the ingot being lest than an hour. The cast was one of a series which had been going on all day, and was carried out by unskilled workmen with a small experimental plant. It is claimed that the metal produced is pure, and that in this respect it has an advantage over that obtained by the various electric processes. The cost of its production is set down at 6s. a pound, while its present selling price is 48s. a pound. Since aluminium bronze requires only 5 to 10 per cent. of aluminium, while steel and iron only need to be alloyed with one-tenth per cent. to obtain the full benefit of the combination, it is evident that aluminium at 10s. a pound would be a commercial article for which there would be a large demand.—*Engineering.*



MARINE REFLECTOR FOR USE WITH ARC LIGHT.

Working Without a Permit.

Charles H. Haskess, a lineman in the employ of the United States Electric Illuminating Company, was arrested last Saturday while fixing a carbon in an electric lamp on Broadway. Acting under special orders from Superintendent Murray, relative to the enforcement of the new subway law, which forbids any repair or other alteration to an electric lamp without a permit, the police have lately been vigilant in watching for such an offense. This was the first case, Haskess having no permit. When word of the arrest was sent to the office of the Subway Commission, the reply came back that, as the courts had adjourned for the day, it was hardly worth while to hold the man over Sunday for prosecution. Haskess was accordingly released.

—— The Sawyer-Man Company have over 480,000 of their lamps now in use and there seems to be a large commercial demand for them outside of the three companies who have adopted them. They report sales of 131,120 within past ninety days.

Thomson-Houston Marine Reflectors.

The illustration on this page shows the new Marine Reflector made by the Thomson-Houston Electric Company. It is designed for use wherever a strong, intense light has to be projected a long distance. The lamp is of six thousand candle power, and will throw a brilliant light a distance of one mile. It is perfectly adjustable in all directions, so that any angle, horizontal or vertical, can be obtained, and is especially adapted for use on steamboats, at harbor entrances, and in all places where a search light is needed.

Alternate Current Dynamo.

The Mordey is a wide departure from the usual form of alternate current machine, says London *Engineering*, and presents several features of great interest. The armature coils are stationary, while the field magnets revolve. This, of itself, is not new, but the idea is carried out in this machine in a perfectly original manner. The coils are quite thin, and stand between the poles of a revolving magnet, the space separating the poles being very short, and consequently forming a very intense field, which is almost filled with the coils. All the magnet poles on one side of the coils are of one sign (say north), and all the poles on the other side of the opposite sign (south). This is contrary to the usual practice, in which north and south poles occur alternately. It follows from this arrangement that the polarity in the coils is not reversed as the magnets revolve, but instead, it rises from zero to the maximum, and then falls to zero again, and so on. The magnetization of the coils is always of the same character; it merely varies in intensity. This variation is as great as in the old machines, because the field is so much stronger. Formerly, when north and south poles occurred in the magnet, side by side, there was a great amount of sideways leakage between them, but with the present arrangement this is entirely avoided, and the lines of force pass directly through the armature coils. The electrical advantages of this arrangement are also attended by a great simplification of the mechanical details.

The armature coils are formed separately of copper ribbon, which is only $\frac{7}{16}$ inches wide, wound on non-conducting cores. Each core is bolted at the broad end between two brackets, and the ends of the conductors brought out through porcelain insulators. These brackets are then bolted to a gun-mettle supporting ring formed in halves, so that they can be removed without dismounting the machine. The coils stand in the narrow space betwen the poles of the field magnet. This magnet is formed of a central coil wound on a core with polar extensions of the form shown in the engraving. The current from the exciter which is drawn to scale is conducted to the magnet coil by a pair of rubbing rings on the shaft. When in the machine the magnet is provided with covers which prevent needless churning of the air. Next to the contact rings are the collars of a thrust bearing by which the magnet is adjusted exactly with relation to the armature coils. The diameter of the revolving magnet is two feet, 11 inches The weight of the complete machine is about 41 hundred weight, of which nearly one-half is made up of bed plate and parts which have no electrical function.

The dynamo is in fact very nearly self-regulating in itself, as is shown by giving the characteristic of the machine throughout a range of 37,000 watts. From this curve it is clear that practically the whole of the load for (say) 600 lamps might safely be turned off without danger to any remaining lamps, and that probably a large proportion of the load, certainly 50 per cent., could be turned off without attracting notice on the rest of the circuit. It is, therefore, not considered desirable, except under special circumstances, to provide other than a simple hand regulation for controlling the potential difference.

By this arrangement of the armature coils it is easy to obtain various combinations if desired. This circumstance is made use of for simplifying the measurement of the potential. Instead of taking the reading across the terminals, which would necessitate the use of an electrometer or a very high resistance voltmeter, an ordinary voltmeter indicating to 100 or 150 volts is placed across one of the coils.

New York.—The Kwradrite Electric Company, New York, capital, $10,000. John Tepper and others, incorporators.

Weaverville, Cal.—Trinity and Shasta Telegraph and Telephone Company has been incorporated. Capital stock, $10,000.

New York.—The Kookogey Electric Company, New York, capital, $10,000. William P. Kookogey and others, incorporators.

Jersey City, N. J.—The American Electric Motor Co. Capital, $1,000,000. Jesse H. Lippincott, and others, incorporators.

Chicago, Ill.—The Electro Carbon Motor Co., Chicago, Ill. Capital, $1,000,000. E. Reekley Hamlin, and others, incorporators.

Chicago, Ill.—The Chicago Light Company to produce and sell power and light produced by electricity. Capital, $20,000; incorporators, Jesse Scribner, Charles F. Clark and M. J. Grogan.

Chico, Cal.—Electric Light and Motor Manufacturing Company. Stock, $100,000; subscribed, $33,500. Jas. Anthony, A. McFayden, Wm. H. Schooler, B. F. Clarke, Jesse Anthony, incorporators.

Portland, Oregon.—The Oregon Railway Extension Company. Stock, $1,000,000. W. H. Holcomb, W. H. Corbett, Henry Failing, C. H. Lewis. The business to be carried on is to equip railroads and telegraph and telephone lines.

Omaha, Neb.—The Interstate Fire Alarm Company has filed articles of incorporation. The capital is $50,000, divided into $100 shares. The business to be carried on is the manufacture of electric fire alarm apparatus. The incorporators are F. B. Johnson, A. B. Hunt, S. L. Wiley and J. H. Dumont.

Cadosia, N. Y.—The Cadosia Chemical Company, to manufacture all chemicals, either wholly or in part from the wood including acetate of lime, wood, alcohol, charcoal and acetate acid, in Delaware county, with a capital of $80,000, and these trustees: John McDougall, Thomas Keery, and Andrew J. Avery.

Portland, Me.—The Mattha Rubber Company organized. Capital stock $300,000. The stockholders are Theophilus King. Jr., of Quincy, Mass., Stephen M. Allen of Duxbury, Mass., William Faxon, Jr., H. B. Tallmadge, Edward P. Payson and W. M. Brewster of Boston, Mass. Stephen M. Allen is president, John E. Chapman is treasurer. The purpose of the company is to manufacture compounds, resembling hard rubber and soft rubber, for the production, insulation or conduction of electricity, etc.

Gloucester City, N. J.—The Electric Storage Battery Co. Capital, $10,000,000. Waldron Shapleigh, and others, incorporators.

Omaha, Neb.—The Omaha Heating and Power Co. has been incorporated. Capital, $300,000. Victor H. Coffman, and others, incorporators.

Nantucket, Mass.—The Nantucket Electric Light Co. has been incorporated. Capital, $12,000. Henry Riddell, and others, incorporators.

New Orleans, La.—The Consolidated Electric Light and Power Co., New Orleans, La., has been incorporated. Capital stock, $150,000. H. M. Byllesby, and others, incorporators.

Ottawa, Ill.—The Ottawa Electric Street Railway Company. Capital, $100,000; incorporators, T. J. Evans, William E. Bowman, George L. and George Eldrige, James Briggs.

Tacoma, W. T.—The Columbia Improvement Company has been incorporated at Tacoma, W. T. Among other things, they will construct and operate telegraph and railroad lines.

Chicago, Ill.—The Western Light and Power Company. Capital stock, $100,000; to furnish electric light and power; incorporators, William M. Talcott, Carlton Prouty, and Frank Ives.

A Decision in Favor of the Edison Company.

Judge Shipman, of the United States Circuit Court, has filed a decision in favor of the plaintiff in the two cases of the Edison Electric Light Company *vs.* New Haven Electric Light Company. The suits were brought by the Edison Company, to restrain the defendants from the infringement of letters patent covering the three-wire system, granted to Thomas Edison and the plaintiff. Edison assigned the patents to the Edison Electric Light Company, and this company in turn assigned them to a new company of the same, formed by the consolidation of the Electric Light Company and Edison Company, for isolated lighting.

The complainant alleges that by the act of consolidation the title of the Edison Electric Light to the patents in question passed to the Consolidated Company, and that by a resolution of the Edison Electric Light Company passed December 30, 1886, before the consolidation took place, an assignment of the patents to the complainant was ordered.

The defendant states that under the patent laws of the United States the consolidation proceedings were wholly incompetent to transfer to the complainant any title to the patents. The defendant further states that the consolidation was effected December 30, 1886, and that the corporate existence of each of the old companies terminated at that time and that the deed of assignment was not delivered until after the termination of the legal life of the assignor. It was established that the Edison Electric Light Company existed under the laws of New York on December 30, 1886; that the consolidation was effected December 31, 1886; that December 30, 1886, the executive committee of the Edison Electric Light Company directed the president and secretary of the company to deliver to the new company "all assignments, patents and transfers of every kind;" and that the officers did not act on the resolution until January 18, 1887.

Judge Shipman in his decision states that if the analogies are perfect between the death of a natural person and a corporation the position of the defendant is sound, but the defect in the argument is that the old corporation was not technically dead. The new corporation had a right to require a written assignment of the patents. The old corporation recognizing this, charged its officers to make transfers. "It would be a narrow adherence to technicalities to say that it was invalid. The pleas of the defendants are overruled."

John C. Tomlinson and Clarence A. Seward were the counsel for the plaintiff and Fred. P. Fish and Samuel A. Duncan for the defendant.

Copper Steam Pipes.

Steam pipes of copper are now made by electro-deposition from sulphate of copper solution. The pipe is formed on an iron core in the depositing bath, and the deposited copper is pressed by a moving tool as it is deposited, so as to give a fibrous strength to the crystalline copper. After the pipe is thus formed it is subjected to hot steam, which expands the copper shell, or pipe, clear off the iron core, thus separating the two. These pipes have no joint, and are said to be very strong; tests showing that they break with strains of from 27 to 41 tons per square inch.

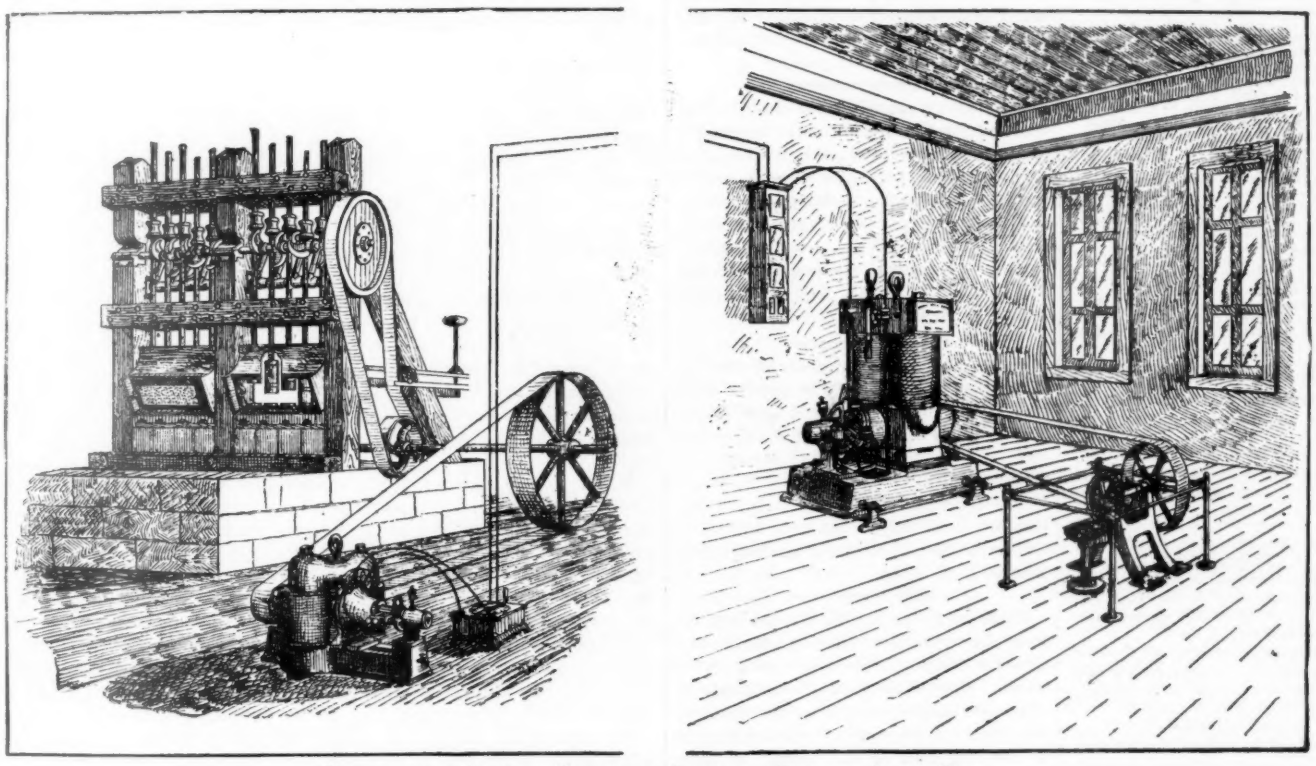
Electric Work in the Far West.

And there are wars and rumors of war in Dakota. In 1887, some time in April, a franchise was granted an Electric Motor Company to place a line of cars within the city of Aberdeen. The franchise to be complete, required the consent of property owners along the line. These consents were not obtained, and the city claims that the franchise is void by limitation in consequence. On the 8th the town was in a fearful state of excitement, the citizens endeavoring by every method and appliance to prevent the Electric Motor people from plowing up the streets. Drays were driven across the streets, and when the marshal undertook to disperse the mob, more citizens appeared with an order from the mayor prohibiting farther work. Somebody has started the story that the Motor Company is merely protecting its rights, and doesn't intend building a road at all.

Electricity runs smoother in Nebraska. At Lincoln a correspondent informs us that the Kearney Electric Light Company has just closed a contract for an Edison plant of 16 c. p. lamps, aggregating 1,000. The plant is to be run by water-power. The dynamos will be belted direct to the shaft of a pair of horizontal twin (Victor) turbines, of Stillwell & Bierce's manufacture. These turbines are 15 inches, and develop 350 horse-power.

The water head is about sixty-five feet, and is brought through a canal some fifteen miles from the Platte River. As this river is fed by the snows of the Rocky Mountains, the supply of water is never failing, and the long canal gives a steady, constant flow, unaffected by floods. The company also has a Thomson-Houston arc plant run from this shaft, giving most perfect satisfaction. The motion is absolutely without appreciable variation.

The plant will furnish power as well as light, and a couple of motors of 20 and 30 horse-power respectively, have been telegraphed for to run the machinery of a brick yard. The Western Engineering Company, of which Mr. J. G. White is president, furnishes the motors, and is doing all the construction.



VIEWS OF THE ELECTRIC MOTOR AND DYNAMO IN USE AT A STAMP MILL.

The Electric Motor in Use in Stamp Mills.

The illustration on this page shows the application of the Sprague Motor to the driving of a stamp mill in Idaho, situated four miles from the primal source of power. Here there are five batteries of ten stamps each. The stamps have forty drops a minute and a dead lifting weight of 6,000 lbs. to each battery, the total energy being 75 horse-power. A transmission of this character enables the manager to locate his mill directly at the mine, and in this case gives 75 per cent. of the primal energy, besides saving $90 a day in haulage alone.

ELECTRICAL REVIEW

Published at 13 Park Row

P. O. BOX 3329.

GEO. WORTHINGTON, - - Editor.
CHARLES W. PRICE, - Associate Editor.
T. J. McTIGHE, Electrician and Manager Patent Bureau.
LOREN N. DOWNS, - - President.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.
TELEPHONE CALL, 546 JOHN.

SUBSCRIPTION.

United States and Canada, $3.00 per annum, in advance. Postage paid by publisher.
Great Britain and other foreign countries, $4.00, in advance. Postage paid by publisher.

ADVERTISING.

Transient, 25 cents per line, nonpareil.

DEALERS SUPPLIED BY

The Albany News Company, Albany, N. Y.
The American News Company, New York, N. Y.
The Baltimore News Company, Baltimore, Md.
The Brooklyn News Company, Brooklyn, N. Y.
The Central News Company, Philadelphia, Pa.
The Cincinnati News Company, Cincinnati, Ohio.
The Cleveland News Company, Cleveland, Ohio.
The Colorado News Company, Denver, Colorado.
The Detroit News Company, Detroit, Mich.
The International News Company, New York, N.Y.
The Minnesota News Company, St. Paul, Minn.
The Montreal News Company, Montreal, Canada.
The National News Company, New York, N. Y.
The Newark News Company, Newark, N. J.
The New England News Company, Boston, Mass.
The New Orleans News Company, New Orleans, La.
The New York News Company, New York, N. Y.
The Northern News Company, Troy, N. Y.
The Omaha News Company, Omaha, Neb.
The Pittsburgh News Company, Pittsburgh, Pa.
The Rhode Island News Company, Providence, R. I.
The San Francisco News Co., San Francisco, Cal.
The South West News Company, Kansas City, Mo.
The St. Louis News Company, St. Louis, Mo.
The Toronto News Co., Toronto, Ontario, Canada.
The Toronto News Co., Clifton, Ontario, Canada.
The Union News Company, New York, N. Y.
The Washington News Company, Washington, D. C.
The Western News Company, Chicago, Ill.
The Williamsburgh News Co., Brooklyn, E.D., N. Y.

EDITORIAL ANNOUNCEMENT

Address all communications and make all Express Money orders, P. O. orders and checks payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Timothy W. Sprague, Massachusetts Institute of Technology, is our representative at Boston, Mass.

Mr. C. C. Haskins, 118 La Salle Street, Chicago, Ill., represents the REVIEW in the West.

NEW YORK, JUNE 23, 1888.

CONTENTS.

	PAGE.
Electric Night Signals	1
How to get rid of Electricity in Printing Presses.	1
Dynamo with Hand Power	1
Tired of the Telephone	1
Estimates of Electrical Energy Necessary for Tram Cars	2
Electrostatic Attraction of Electrodes in Water and in Weak Solutions	2
Aluminium	2
Working Without a Permit	2
Thomson-Houston Marine Reflectors	2
Alternate Current Dynamo	2
A Decision in Favor of the Edison Company	3
Copper Steam Pipes	3
Electric Work in the Far West	3
New Corporations	3
The Electric Motor in use in Stamp Mills	3
A New Convert to Underground Wires	4
Our Chicago Letter	4
Our Boston Letter	5
Our Philadelphia Letter	5
Notes on Electric Club Matters	5
The St. Louis Telephone Trouble Temporarily Compromised	5
Telegraphic	6
Non-Magnetic Balances and Alloys	6
The Phono-Signal as Adapted to Submarine Telegraphy	7
Manufacturing Notes	7
Mr. Whipple Complimented	7
The Telephone Situation at Evansville, Indiana.	7
A Western Union Dividend	7
An Electric Storage Suit	7
Electricity at the Ohio Exposition	7
Telephonic News	7
Thomson-Houston Electric Railway System	8
Electrical English Notes	8
New Alternating Dynamo	8
Against Execution by Electricity	9
Trial Trip of an Electric Boat made in this Country	9
Electric Coal Mining Machine	9
The Underground Conduit in Boston	9
Electric Light News	9
Electrical Patents	10

On the 6th the National Subway Company, of Chicago, secured a thirty-year franchise of the St. Paul, Minn., council. Now for some more of the arguments of those fellows who swear at underground successes.

In the case of the American Bell Telephone Company against Cushman, Judge Blodgett, of Chicago, has reserved his decision. There seems to be no doubt but that the decision will be favorable to the Bell Company.

The telephone is apparently a fascinating object for many would-be statesmen. A city councilman or a member of the legislature, can hardly be classed as having made his *debut* properly unless he has introduced a resolution or bill investigating the telephone business. Butchers and bakers and candlestick makers should be grateful that they are not telephone men.

Mr. John P. Barrett, the able and wise electrician of the city of Chicago, honored a few of his New York friends with a visit this week. Mr. Barrett has inaugurated the plan of having Chicago own and operate its own electric lighting plant, and under his strong administration of the city's electrical affairs this idea will, no doubt, be carried to a successful and practical issue.

The REVIEW extends to the Boston Electric Club, on the occasion of the celebration of its first anniversary, this week, sincere well wishes, and hopes that the club and its work will meet with sustaining recognition, and become all that its earnest and enthusiastic founders desire. A particularly agreeable programme has been planned, and will no doubt be greatly enjoyed by members and invited guests.

The Johns Hopkins University has awarded Certificates of Proficiency in Applied Electricity to the following-named: Cary Talcott Hutchinson, Ph.B., Washington University, 1886, of Missouri; Joseph Lee Jayne, U. S. Naval Academy, 1882, Ensign, U. S. Navy; Henry Hazlehurst Wiegand, A.B., Johns Hopkins University, 1885, of Baltimore; Gilbert Wilkes, U. S. Naval Academy, 1881, Ensign, U. S. Navy.

Electric lighting in this city is about ten years old. Five deaths have resulted in that period in this city, from contact with electric wires. Three of the victims were employés of electric lighting companies, the other two meeting death from their own carelessness in catching hold of the wires. Is there another business of the magnitude (employing as many men), of that of electric lighting that can show such a small list of fatal accidents? We think not.

The large circle of friends of Mr. A. F. Upton, so long identified with the Jarvis Engeneering Company, will receive with sorrow the news of his death in Boston, June 8. Mr. Upton was an energetic business man, and it is probably due to his unceasing work to advance the interests he represented that his untimely death from paralysis of the brain resulted. The REVIEW sincerely deplores his decease and extends sympathy to his business associates by whom he was universally esteemed.

It would be a good thing for inventors in general to keep a diary of their work, putting down the important points and drawings regularly and systematically. Several of the most successful inventors have always done this. A case in point is that of Mr. Rudolf Eickemeyer, of Yonkers, New York, who has amassed a comfortable fortune out of the invention of machinery, and who has recently become favorably known to the electrical fraternity through his improvements in dynamo machines. Mr. Eickemeyer has kept a daily record, or as often as occasion demanded, of all his work since 1866 and the value of this record has often been tested in court; besides it has proved a most desirable reference, preventing duplication and unnecessary work.

A NEW CONVERT TO UNDERGROUND WIRES.

One of those women who

"Truly long to do good and be useful,
Though really, between you and me,
The fad philanthropic possessed her,
Because 'twas the fashion, you see,"

once asked a sea-captain how the temperance cause flourished in Madagascar. The old salt replied that he did not know as he was the proper person to give an authoritative answer on such questions; for, although he was a temperance man, he was not a bigoted one, and never drank, unless there was some one to drink with him. But he could say, from the best of his belief, that the temperance society in Madagascar was in the most flourishing condition; that its membership was all of a life tenure, without any opportunity of backsliding; and yet, consistent as it was in vitality, it was limited in membership to unity.

The one member referred to was a native chief who stole a large bottle of Perry Davis' pain killer on the vessel, thinking it some kind of spirits and drank it at one greedy draft. Longing for more water than he could drink, he jumped overboard, and the swim ashore saved his life.

There is at least one lineman in Lynn, the headquarters of the Thomson-Houston Company, who, in like manner, is consistently and thoroughly in favor of underground wires. When he ascended one of the poles connected with the arc-lighting system of that city, a few days ago, for the purpose of making some changes which required the addition of a small cross-piece, instead of fastening it directly to his person, he left it on the ground, secured to the end of a rope reaching to his belt, intending to pull it up after he had ascended the pole.

A couple of full-grown mastiff pups were frolicing around, and as the lineman reached the top of the pole, the piece of wood was snarled around and became at once an object of amusement for the dogs; each of them seized the piece of wood and began pulling from each other, leaving the lineman in a position of neutrality.

Wishing to pull the wood up, he strained the line a bit, and the dogs thinking that was merely for the purpose of assisting in their amusement, at once began to pull against him very hard; so much so that he did not dare to let go his hold, but hung on to the top of the pole for dear life, while these dogs, weighing perhaps one hundred and fifty pounds apiece, were pulling on the other end of the rope with a mistaken zeal which is often the motive for the worst of deeds.

The poor fellow shouted all manner of things to the dogs, who merely redoubled their sport, changing the monotony of steady pulls by occasional jerks which caused both pole and lineman to tremble.

The antagonism between brutes and man became mutual; the man pulled, so did the dogs; the man scolded, the dogs growled; the man let go with one hand to shake his fist, but the dogs shook their heads without letting go; the dogs had gravity on their side and a good firm hold with canine teeth, the man had gravity against him, and felt that his spurs were working loose.

The good book says that "the battle is not to the strong" or the dogs would have got the best of it.

The affair happened in a rather sparsely settled portion of the city, and the result came very near being of a serious nature; for it was not until the man was nearly exhausted by his efforts to hold on to the pole, that a grocery man drove by and called off the dogs.

These dogs were of the purest breed, all having grandfathers whose courtships were arranged with the precision of the Bourbon aristocracy, and their results recorded with exactness of the Jewish Patriarchs; yet, in addition to this gilt-edged pedigree, the owner considers that the struggle has resulted in the making of the pups.

Isn't another alternate current electric motor about due? Or has the work of Nikola Tesla started the versatile inventors to thinking and experimenting in a different direction?

OUR CHICAGO LETTER.

(Special Correspondence.)

The Sprague Electric Equipment Company, of Chicago, with a capital of $100,000, was recently incorporated with headquarters in Chicago. The organization has for its object the furnishing of electrical equipments for street, elevated and general railway systems, and also the installing of motors and dynamos for power and lighting purposes. The company is of course an offshoot of the parent company in New York, but is organized to work independently thereof. Mr. J. L. Barclay holds the helm of the new vessel.

Mr. J. W. Godfrey is again in the city, and as he modestly puts it, is "trying to sell some more of that awful Grimshaw wire," and that mustache still waves.

A novel application of electrical power is on exhibition in Haynes' millinery establishment in Chicago. A miniature landscape is fitted up with hidden carriers on the rope transmission principle, and a lot of bonnets and other female toggery for the head is fastened to the cable like cars. When the switch is turned the bonnets set up a march, and go cavorting all over the landscape.

Mr. Haynes, proprietor and inventor, has patented it "for every country in the world," and draws some ludicrous pictures for its adaptability. "Think," said he, "how a procession of garments in a tailor's window would show off trowsers and coats." In short, the adaptability to many kinds of moving advertisements is almost unlimited.

The telephone is again to be hectored by the city. Corporation Counsel Green has begun to investigate the question of municipal interference in the matter of rentals. Heretofore it was presumed that only the legislature had that power, but the courts of Missouri and of Ohio have decided otherwise, and the question will probably come before the City Counsel again.

In New Orleans, the other day, about the middle of the afternoon, a little blaze broke out under the gallery of 145 Gravier street. The trouble was due to a guy wire of the Louisiana Electric Light Company becoming fouled with other wires. No harm was done fortunately, but as the guy wire was attached to an iron post supporting the gallery, after the fire was over the human monkeys had much amusement taking shocks, and it was rather amusing to see how quick a man would take his hand off when he happened to touch it, or get away when he leaned up against it. A large crowd soon gathered, and many of them got a good shock gratis. Young America was there in full force, and soon caught the secret, and had lots of fun getting others to investigate.

On the 14th a little blaze occurred in the telephone branch exchange in Chicago's Northern Division 239 Clark, in what is known to the telephone people as "Three" office. What set the fire which took in the cable back of the switchboard, is a mystery, as it occurred at a time when no electric lights were burning in that division of the city. It was probably current brought by the Chicago and Milwaukee wires, as that city was in lots of electrical trouble at that time.

The Storm King is still holding high carnival throughout the Western and Northwestern States. The number of deaths appears to be unusually large, and a good many of these are voters. A prominent electrical politician has been gathering statistics, and says if the present ratio is kept up, his candidate for President must surely be elected.

As usual, the freaks of the electrical part of the display, are notable. This time the current has been playing the rôle of a curative agent. Judge Arnold, of Argonia, Kansas, has been deaf for thirty years, and during a tornado which wrecked his office and the court room was subjected to a shock which completely restored the deaf ear to its natural sensitiveness and he can now hear as well as ever.

Miss Annie Evans, of Youngstown, near Pittsburgh, Pa., a ten-year-old Miss, had lost her voice while singing in public. She could only speak in a whisper, and was getting worse. While she was sitting at an open

window, looking at the storm, along came a flash of lightning with a heavy clap of thunder under its arm, and scared a good healthy scream out of Annie, and now she can squeal at a mouse with the best of 'em.

Milwaukee, on the 14th inst., had the worst electric storm known there for years. The telephone service was suspended for an hour. The company suffered severe loss by wire damage, one heavy steal cable being burned out entirely. The cable-house took fire and the fire worshippers had to be called on to extinguish it.

Joliet, Ill., has had a little tempest in a tea-pot, on the rates charged for telephone service. The town kicked over the traces awhile ago, and metaphorically said some very bad words. The row has been settled, and the company has conceded a reduction. Business telephones for the Joliet merchants will hereafter be rented for $54, and residences will be furnished at $36 per year.

The annual election of the Chicago Electric Club, will be held at its rooms on the 21st. No ticket has as yet been nominated, but the Club will get there. A new office has been created by the board of managers, and the writer has been selected to fill the place—that of custodian. The custodian may in future be found at the Club rooms from 12 noon, to 1 o'clock P. M., and will be pleased to welcome all visiting bretheren.

The immense auditorium building, which has been temporarily arranged for the National Republican Convention will be used this evening (Monday) as a concert hall, and a grand war concert given. To-morrow the convention will be opened, and it is quite certain that after that body has adjourned, the concert will be repeated.

The electrical plant, temporary though it is, is very complete and effective in its results. Messrs Leonard & Izard have placed 2,260 full 16 candle power Edison lamps in the building. The engines, two in number, are Ide's. The dynamos are also two, number 30, with a capacity of 1,200 each.

There are 26 stars combined in two circles, each star comprising 10 lights, the circles surrounding portraits of Grant and Lincoln. There are also 22 other huge stars, with 21 lamps each.

A shield eight feet high, is covered with red, white and blue lamps of 16 c. p., 440 in number, and the effect, when this beautiful cluster is thrown on by a single switch, is to say the least electrical. Arches and scattered clusters complete the decorations.

A test of the plant showed that the 2,260 lamps require 206 indicated horse-power.

June 18, 1888. C. C. H.

OUR BOSTON LETTER.

(Special Correspondence.)

The electrical business is quiet in Boston. The atmosphere throughout Massachusetts has been full of electricity during the past few days, and lightning has been playing havoc with country houses, barns, etc. In several instances people have been killed outright, while at Harwichport, Mass., the lightning was so severe as to cause two women to die of fright.

Boston's Common Council, with its usual propensity for dabbling in electrical matters, has followed the example set in St. Louis, by taking up the question of telephone charges in Boston, and has appointed a committee to investigate the matter during the summer, and to report in September. It is to be hoped, however, that the Boston Council will not take the same stand as was taken in St. Louis, for it seems unfair to deprive of the accommodations of the telephone those subscribers who consider its use to be worth the amount at present paid for it, as would be the case if the rates were reduced to such a figure as would not allow the telephone company to operate with a fair profit.

Mayor O'Brien, in his communication to the Council regarding the conduit order passed by the Board of Aldermen June 6th, states the case in a clear and concise manner, and shows that his veto has been made after a careful and logical consideration of the matter, and that it is dictated by his desire for the best interests of the city. The following is the communication:

To the Honorable the City Council: Gentlemen.—After passing the order of May 7, granting the use of our streets to a corporation for twenty years, which order has been pronounced illegal by the law department of the city as a franchise which the Board of Aldermen had not the power or authority to grant, it appears to me that the order of June 6, herewith returned without my signature, is but a continuation of the same system of legislation—to force all underground wires into the hands of one corporation. In other words, the orders of May 7 and June 6 are closely connected together.

The Bell Telephone Company received authority ffom the Board of Aldermen to construct conduits for their wires underground. This work has been but partially completed, and I think that it would be an injustice to that company to interfere with them in the carrying out of the work already commenced.

If the board desire to restrict the opening of our streets, I am in sympathy with them; but if it is their intention to restrict all rights to construct conduits to one company, whose franchise has been pronounced illegal, I shall be forced to return all orders which give countenance or assistance to such a grant without my signature, especially when the advice of the law department of the city is completely ignored by the Board of Aldermen in relation to such grants.

Yours respectfully,
HUGH O'BRIEN.

The West End Street Railway Company is to give a trial to electric railway systems, using overhead wires, and has withdrawn its petition for the present, to be allowed to introduce the cable system in Cambridge.

The directors of the Salem Electric Light Company have declined to furnish power for the street railway electric motors, fearing that the demand would be so great as to impair their service. The street railway company will probably establish a new plant.

Several cars of the Naumkeag street railway, which runs between Marblehead and Danvers, are to be fitted with electric motors to be used on the Willow Branch Line.

The aldermen and Common Council of Newton, met in joint assembly to hear the views of citizens on the order before the city council, authorizing a contract with the Newton Electric Light Company, to do the entire street lighting of the city at an expense of $27,000 per annum.

The New England Telephone and Telegraph Company is laying conduits for wires on Cambridge street and Atlantic avenue in this city.

The Commercial Union Telegraph and New England Telephone Companies were granted permission to erect poles and string wires in Central, Church and other streets in Lowell.

The Somerville Board of Aldermen, on June 13th, passed an order awarding the contract for placing 24 police signal boxes in the city, the city to furnish the wires, to the Municipal Signal Company (Wilson System) for $3,488.88.

The Melrose selectmen have just contracted with the Malden Electric Light Company to place twenty-six arc lights and forty incandescent lights in various parts of that town. The electric light wires are now being placed in position.

The Malden Electric Light Co. has just received two powerful engines which are to be placed in the new station on Charles street.

The Hartford City Government has granted permission to the Hartford and Wethersfield Horse Railroad to use electricity as a motive power on a part of its line.

The work of procuring subscriptions of twenty-five dollars each for lighting the streets of South Weymouth by electricity is progressing rapidly and the committee is greatly encouraged at the prospect of success.

Professor Chas. R. Cross, of the Massachusetts Institute of Technology, has returned from his short trip to Jackson, N. H., and will sail for Europe in company with Dr. W. W. Jacques, of the American Bell Telephone Company, the latter part of June.

Boston, June 18, 1888. L. K. F.

Mr. Norman McCarty, of the Baxter Motor and Manufacturing Company, Baltimore, is in the east stirring up motor matters with his usual earnestness.

Mr. J. E. Talbot, of the Ft. Wayne Jenney Electric Light Company, was a New York visitor last week. His company he reports as very busy with large orders for electric light apparatus.

OUR PHILADELPHIA LETTER.

(Special Correspondence.)

The Philadelphia Edison Company has just issued a circular in response to the frequent inquiries as to the date when they will be ready to furnish would-be customers with the long anticipated current, and from it I glean the following facts:

All that portion of the city between the limits of Third, Broad, Walnut and Market streets, and Broad, Walnut, Chestnut and Twenty-third streets, is now underlaid with their conduits and wire, and as soon as the central station at 908 Sansom street is completed, they will be ready to supply the current, at a price based upon a uniform charge of one and one-eighth cents per hour for each lamp of 16 candle power actually burned. The amount of current to be determined by an Edison meter on the premises of each consumer, which is said to be "a commercial adaptation of the zinc voltameter, to be relied upon as more accurate than any gas meter."

The company proposes to put in service mains to each house, upon application of the owner, and furnish and attach meters in the cellars free of charge, but the expense of wiring the interior must be borne by the owner, and the installation completed subject to the approval of the Edison company, otherwise the current will not be supplied.

In the matter of motors, the circular says: "As this company does not express any preference for any particular make of motors, it will furnish all power by meter, charging 25 per cent. less than for lamps used for lighting." It further says: "This company has now completed the greater portion of its laying of conductors in its district, and has placed the contracts for its central station, which it will have completed next September.

This ought to settle the question of the date when the current will be ready for distribution.

The Germantown Electric Light Company has bought a 100 horse-power Buckeye engine, and will proceed at once with the increase of the plant.

I do not know but what I am trespassing on the provinces of your local news-gatherer when I refer to the new Westinghouse station in New York, plans for which I saw this week in the office of one of our noted electrical engineers in this city. As you doubtless know, it will be located at the foot of Twenty-fourth street, on the North River, and will be constructed with an ultimate capacity of 7,500 lights of 16 c. p., although the preliminary plant will embrace but one-tenth of that number. Of course, this enterprise, with the unlimited capital it commands, will exhibit an installation of the highest type, and will show what can be done with Westinghouse engines and dynamos, backed by high engineering skill and intelligent management.

The Grove Electric Meter Company, 1,406 Chestnut street, Philadelphia, have made one or two important changes in the construction of their apparatus, simplifying its action and doing away with its former cumbersome appearance; the main objection to the meter has arisen from the fact that a wire had to be run from each lamp to the comutator of the meter, and that it was simply a contrivance to register the number of minutes that the lamps were burning without registering the amount of current used. No question is raised that the candle-power of the incandescent lamp being known the action of the meter is perfect, and a denial of its trustworthiness presupposes a state of affairs wherein the consumer would buy lamps of greater candle-power than he was charged for, and would keep sentinels on watch to notify him of the approach of the meter inspector, and detain that official in the hallway until the smaller lamps could be put in the socket previously occupied by the larger ones, on which the current had been stolen. As most other matters must depend upon scientific, mathematical accuracy in their parts, it would seem that the moral hazard of the Grove meter ought not to be considered of moment in estimating the relative advantage. S. H.

Philadelphia, June 18, 1888.

NOTES ON ELECTRIC CLUB MATTERS

The visiting list is quite large, nearly every visitor to the city with any electrical interest making it a point to visit the Club with some member during his stay in New York.

The Entertainment Committee expect to provide not only regular monthly lectures, but have well informed gentlemen address the Club at much shorter intervals. These additional meetings will probably begin after the vacation months.

The departure of Mr. Davis for England leaves the Club without a president, but not without several able vice-presidents. Messrs. E. T. Gilliand, O. E. Madden, Geo. W. Hebard and Geo. L. Beetle, are the capable gentlemen elected as vice-presidents in the order named, either of whom would adorn the chair as presiding officer.

The new steward of the Electric Club, Mr. S. H. Hummel, was formerly assistant steward of the Union League Club of Philadelphia.

The Baxter Electric Motor Company and the "C. & C." Motor Company have each presented the Club with motors which will be put to excellent use for ventilating and cooling the club-house this summer.

The valuable and beautiful painting presented the Club by Mr. T. N. Vail is noticed and admired by all. Two Persian gray-hounds are portrayed, one standing and the other lying down. Both are strikingly life-like. The talented artist, Elizabeth Strong, is an American lady, whose paintings are to be seen in the Paris Salon, where they have attracted much favorable comment.

Frank Leslie's weekly recently pictured various Electric Club scenes, an ideal one showing Treasurer Candee working the electric combination to unlock the safe.

The Club house habitues hope to see more of Manager and House Committeeman H. L. Storke, now that he has returned triumphant from St. Louis, where he helped to renominate his old friend Cleveland. Until he finished his political duty his Club associates were willing to forgive his absence, but now his genial presence they call for.

A handsome painting from one of the zealous non-resident members will soon add to the attractiveness of the Club parlors.

The June meeting will be held on the 28th of the month. Prof. Wm. A. Anthony will speak on "Overhead Wires"—a timely and prolific topic.

THE BOSTON CLUB'S ANNIVERSARY.

The official notice of the Boston Electric Club's anniversary have been issued, and state that a reception will be held at Club rooms, Thursday, June 21, from 1 to 4.30 P. M., which will include addresses and an exhibition of the phonograph. At the conclusion of the reception, the attendants will take a steamer for Nantasket Beach. Dinner will be served promptly at 6.30 P. M. Special cars will convey the guests and members back to Boston upon the conclusion of the dinner. It is safe to predict that the affair will be a most enjoyable one.

The St. Louis Telephone Trouble Temporarily Compromised.

At a public meeting the telephone company of St. Louis, submitted a proposition to replace all the telephones taken out and charge a rental of $50, complying with the city ordinance, until its validity is tested before the Supreme Court, a case being now on hand which would be forced to a rapid conclusion. In the event of a decision in favor of the Bell company the renters of telephones will pay at the former rate of $100 per year, but the company does not say what it will do in case the decision is against it.

This restores the telephones already taken out, and will keep them in until the Supreme Court has passed on the legality of ordinance finally. If the court sustains the the ordinance and the Bell company increases the charges to $100 it is predicted that there will be another mass-meeting of subscribers, and an investigating committee will be appointed to find out what the service costs the company. If it is then learned positively that the cost is over $50 the ordinance will be amended to the proper price, and if the contrary is learned all the telephones used by members or the Users' Association with be ordered out.

Mr. Wm. S. Hine, of the United States Electric Lighting Company, has returned from Buffalo flushed with victory. Barnes, Henderer & Co., the Niagara Hotel, and the Buffalo Exchange, have all decided to be lighted by this system, aggregating about 3,500 lights in all. Mr. Hine will probably visit Buffalo again.

TELEGRAPHIC

.... A lodge of the Order of Railway Telegraphers has been organized at Birmingham, Ala.

.... The Gamewell auxiliary fire alarm boxes have been adopted quite generally in Fall River, Mass. A number of the large mills have already been connected, and the system is meeting with popular favor wherever tried. The State House in Boston has just been connected with the city fire alarm by means of auxiliary boxes.

.... An old operator says that "Telegraphers are born, not made; there are some men who can never learn telegraphing." So there are, so there are, and oh, how often, how earnestly do we wish there were more like them. This feeling comes over us most strongly when we are handed a message saying: "To Povert J. Jebberntt—Povd nxx quod not said lldint wrxly to-morrow evening morltd tbbly Collect $1.85." Then it would do us more good to hear that one telegrapher had died than to learn that 50 had been born.—*Bob Burdette.*

.... The Central South American Telegraph Company's surveying staff is now engaged in locating its proposed telegraph line across the Isthmus of Panama, the company having secured from the United States of Colombia the necessary concession for operating a line. The obtaining of these concessions is owing largely, it is said, to the demand of the United States government, the telegraph company having been opposed by the Panama Canal Company. It is thought that any further resistance on the part of the canal company will raise international questions.

.... James R. Taylor, a banker and broker at No. 29 South Third street, Philadelphia, has commenced suit in the Common Pleas against the Philadelphia Local Telegraph Company. His complaint against the company is that a few days ago they cut the wires leading to the stock "ticker" in his office, thus depriving him of the stock quotations, to which he is entitled under a contract made with the company. Mr. Taylor alleges that he has regularly paid for the service, and that the defendants have no right to thus summarily deprive him of the current quotations of stocks. Judge Arnold issued a preliminary injunction restraining the company from removing the ticker until the matter is heard in court.

.... The history of the Western Union Telegraph Company shows a steady and marked increase in the business year by year, and Boston has done its share towards making up this increase, claims the Boston *Herald*. The Boston office is by no means a handsome one, but it is splendidly managed; its record is as good as that of any office in the country. Even the main office in New York cannot make a better showing for the volume of business done. The Boston manager, Mr. Charles W. Henderson, and the district superintendent, Mr. Roche, are entitled to high credit for their efforts in perfecting the arrangements that have brought the Boston office up to such a pitch of efficiency. They have a large and able staff, and it is pretty safe to say that if anything goes wrong on the lines, which is very seldom the case, it is not their fault. They not only understand their business thoroughly, but they are also most accommodating in disposition, and the public with which they deal, and whose messages they send, has no reason to be other than gratified by their fidelity and zeal. It is necessary for them to have their business at their fingers' ends, as will be apparent when it is stated that the State street office handles each year between five and a half million and six milllion telegraph messages—local, interstate and foreign. It is easier to speak of these figures than it is to realize the amount of work with which they are associated, and the perfection and complexity of the system which they involve.

Non-Magnetic Balances and Alloys.

As you have for some years pointed out, the use of steel in the quick-moving parts of watches is doomed, and the communications of Mr. Haswell and Mr. Webb in the March number of the *Journal* on the researches and achievements of Mons. Paillard in the direction of providing an efficient substitute that shall be independent of magnetic influence were, I believe, exceedingly welcome to and appreciated by horologists generally. The devotion, through a long series of years, of Mons. Paillard to this subject and the fact that his labors are for the benefit of the horological world at large, would seem to lift his efforts out of the narrow sphere of national prejudice or trade rivalry, and it is therefore not a little surprising to find a watchmaker of position, and one of his own countrymen into the bargain, ready to dwarf and minimize the claims of Mons. Paillard to our recognition and gratitude.

I am in no way concerned to defend Mr. Haswell and Mr. Webb from the strictures of Mons. Hoffer—they are doubtless quite able to take care of themselves—but, before submitting a few remarks on the question of non-magnetic balances and alloys, I cannot refrain from pointing out to Mons. Hoffer that the chief drawback in the balances of silver and platinum, as used by Arnold and Dent, was their softness. This has been the prime difficulty with most subsequent inventors, as is well known to the majority of those who have tried non-magnetic balances of the various substitutes for steel that have been from time to time suggested. Mons. Paillard has given us a balance with the necessary rigidity; and herein, I take it, lies the great merit of his discoveries.

After reading the papers in the March number of the *Journal* I was curious to know the composition of the alloy used by Mons. Paillard, but in his English patent (1886, No. 8,730) this is not given. Professor Houston has recently given an exhaustive paper on the subject in that admirable publication, *The Journal of the Franklin Institute*, and from it I take the following:

"The alloy described in the first U. S. specification contains the following metals, viz.:

Palladium	60 to 75 parts.
Copper	15 " 25 "
Iron	1 " 5 "

"We will for convenience call this alloy No. 1.

"The specification states that the preceding proportions or percentage may be somewhat varied, without appreciably affecting the essential characteristics or properties of the alloy.

"The process for the production of this alloy is as follows: About half of the palladium to be used is placed with the other metallic ingredients and with a small quantity of borax and powdered charcoal in a clay crucible and heated until melted. The remaining part of the palladium is then added, and when the whole is melted the molten mass is poured into a suitable mould and when cooled is ready for use.

"U. S. Patent, No. 367,159, describes an alloy cheaper in its production and suitable for a lower grade of watches, or for certain parts of watches.

"The inventor makes the following statement in the specification: 'I have found by experiment that the alloy hereinafter described and claimed can be successfully employed in the manufacture of watches and timepieces for all the parts not required to be non-magnetic and hardly dilatable, as it is not perceptibly affected by ordinary magnetic or other disturbing causes or influences. The cost of its production is also such that it can be profitably and economically used for all the ordinary parts of watches and for the mechanism of the cheaper grade of watches, where perfect uniformity and regularity of movement under all circumstances is not required.'

"The composition of the above alloy (No. 2) is as follows:

Palladium	50 to 75 parts.
Copper	20 " 30 "
Iron	5 " 20 "

"The method adopted for its manufacture is the same as that described for the first alloy.

"U. S. Patent, No. 367,160, describes an alloy possessing in the highest degree the properties desired in parts of high-grade watches liable to change of rate.

"The following is the composition of the alloy (No. 3) that is described and claimed in this patent:

Palladium	65 to 75 parts.
Copper	15 " 25 "
Nickel	1 " 5 "
Gold	1 " 2½ "
Platinum	½ " 2 "
Silver	2 " 10 "
Steel	1 " 5 "

"The same method is used in the manufacture of this alloy as in the preceding alloys.

"U. S. Patent, No. 367,161, describes an alloy which, besides possessing the properties of the preceding, possesses the additional property of being raised by tempering to a very high degree of hardness. He uses the alloy as follows: 'In order that the best result may be obtained in watches and chronometers, I have found that it is necessary that other parts of the mechanism employed therein, viz, the escape-wheel, escape-lever, guard-pin, and regulator-index shall possess the same characteristics and properties, and in addition thereto be capable of being tempered to a high degree of hardness to prevent wear and abrasion.'

"The parts above mentioned are the parts which, as we have seen, are sometimes made of manganese alloy.

"This alloy (No. 4) has the following composition, viz:—

Palladium	45 to 50 parts.
Silver	20 " 25 "
Copper	15 " 25 "
Gold	2 " 5 "
Platinum	2 " 5 "
Nickel	2 " 5 "
Steel	2 " 5 "

"The process of manufacture of this alloy is the same as that used in the other alloys.

"The following experiments were made to test the non-magnetic character of the palladium alloys and the extent of the protection afforded to the watches before alluded to, when placed in various magnetic fields.

"Two palladium hair-springs of different alloys were placed in a uniform field, the direction of the lines of force in which was determined by a very thin layer of iron filings. On placing the springs in various positions in the field no change in the grouping of the lines was observable. They were neither concentrated on the palladiuma alloys nor repelled from them; that is is to say, they were neither appreciably paramagnetic nor diamagnetic.

"According to the experiments of Faraday and the later investigations of Plücker, palladium is a paramagnetic substance; that is to say, it concentrates the lines of force upon it after the manner of iron. Its paramagnetic properties are, however, comparatively feeble.

"Bearing in mind the paramagnetic character of many of the components of the precedent alloys, their failure to exhibit any of the properties ordinarily recognized as magnetic is interesting from a scientific standpoint. Thus in alloys Nos. 1 and 2, the copper is the only component that is diamagnetic. In alloy No. 2, the steel and nickel are powerfully paramagnetic, and the palladium and platinum are also paramagetic. The copper, gold and silver only are diamagnetic. In alloy No. 4, all the components are paramagnetic except the copper, silver and gold.

"The masking of the paramagnetic properties of some of the components of an alloy would seem to point to the probability of such alloys being formed by true atomic, or chemical combination.

"In order to observe the effect of an intense field on the springs they were placed in the very powerful field of an electro-magnet, the massive pole-pieces of which were but a few inches apart. No deflection of the light springs was observed when suspended in this field. When allowed to fall through the narrow gap between the pole-pieces, they fell quite freely. The intense field failed to produce any appreciable magnetism in them.

"Similar experiments were tried with the compensating balance-wheel with the same result."

Professor Houston says the segments of Paillard's balances consist of two laminæ of different palladium alloys, the co-efficients of expansion of which are so proportioned as to permit them to act as in the compound balance of brass and steel. This does not agree with the prescription in Paillard's English patent, which clearly defines the inner part of the rim as palladium alloy and the outer part as silver or brass. It adds:—

"After melting the alloy, the molten metal is poured into a mould to form a plate. This plate, when cold, is forged or hammered being frequently heated to red heat, if becoming too hard, until the desired thickness is obtained. There is then stamped out, by means of a die, a disc, in the centre of which a hole is pierced, and the disc is turned true. The hole and the one side of the disc is then filled up and covered with a fire-proof clay, or any such suitable material (plumbago, for instance) which is allowed to dry on the disc, so that the latter, in all its parts so covered, will not be touched by the second metal in the subsequent operation. The so prepared disc is now inserted in a crucible, in which pieces of brass or silver and borax are placed and melted, the crucible being introduced into a muffle furnace. The molten metal will form a rim around the disc. If preferred, the silver rim may be produced by depositing this metal by a galvanic process.

"The melting of the meltal around the alloy disc will require some skill or experience, inasmuch as care must be taken that the metal is not heated more than required for melting the same, so as to avoid melting of the alloy disc, or even to avoid the molten metal attacking the alloy disc. If the rim or ring is made of brass, the melting of the latter may be facilitated by an ample addition of zinc, which may form 40 to 50 per cent. of the brass. In using silver, about 20 per cent. of zinc may be added. The ample addition of zinc offers this advantage, that the metal becomes more expansible, and thereby increases the function of the bimetallic balance. If silver is deposited by the galvanic process, this will require the employment of screws or heavy masses, for the compensation to be a sufficient one.

"The rest of the work for making the balance is an entire mechanical one, and does not differ materially from the method heretofore in use.

"First, the excess of metal is removed by means of a file or a hand-tool lathe, and then the centre part of the disc, either from one side, or from both sides, is hollowed out, so that in this centre part there remains a thickness only, corresponding to the thickness of the middle arm, which is to be cut out, care being taken to preserve a bimetallic rim of such width, that it is composed by ⅓ of palladium alloy and by ⅔ of brass or silver. By partially removing the remaining central part of the disc (by filing or otherwise), the central arm or arms for the central pin are formed, so as to complete a balance.

"The boring of the screw holes and the cutting of the thread in them, is made by means of a dividing engine.

"The arm or arms of the balance, as well as the interior of the bimetallic rim, are generally tempered, whereas the exterior, and the faces of said rim, may be polished.

"It is desirable, in order to give hardness, to heat the balance in the same way as for tempering hair-springs. The bimetallic rim of the balance is then cut toward the arms, and provided with its screws or set weights."

Professor Houston also says that a watch would gain and not lose when moving through the resisting medium of an intense magnetic field. This is surely an unwarranted deduction, because, though the arc of the balance would be decreased, the time of

vibration would, to some extent, be dependent upon the isochronism of the spring. At all events, an irregular but slow going is often observed with a magnetized watch.

The necessity of providing a remedy for the present liability of watches to become magnetized is so pressing, that I feel warranted in asking others to give us the result of their investigations. I believe Mr. T. D. Wright, the able lecturer at the Horological Institute, made some experiments in this way, and though I am not authorized to refer to it, I think I am correct in saying that one of the very best non-magnetic balances by Messrs. Nicole, Nielsen & Co. has the inner part of the rim of an alloy of platinum and that intractable metal, iridium. This would, I imagine, be very costly. What is the feature of the Longines' non-magnetic watch—is that Paillard's alloy? Messrs. Baume & Co. could probably furnish particulars. Then there is the Waltham non-magnetic watch. Perhaps Mr. Bedford, the courteous London manager of the company, would give us some details of its construction.—*W. S. Barron in London Horological Journal.*

The Phono-Signal as Adapted to Submarine Telegraphy.

A telephone placed directly in connection with a cable gives out no audible sound, because the number of vibrations of the diaphragm falls below twenty per second, which is the lowest limit for the human ear.

Suppose, now, that the current from the cable, instead of passing directly into the receiver, passes first through a vibrating or rotating commutator, which will interrupt the current a great number of times per second. On sending through the cable Morse signals, consisting of dots and dashes, without reversing the current, sounds can be heard in the telephone; they will be more or less prolonged and more or less powerful, and will enable the dots and dashes to be readily recognized.

A cable can, however, be more readily worked by means of currents alternately positive and negative. Such currents applied to the above-mentioned apparatus would not allow the positive to be distinguished from the negative. The arrangement has to be modified to meet this case of alternate currents. The commutator sends the current from the cable alternately into each fork of a branched circuit, comprising two telephones, one of which is held to each ear. At a point of the branched circuit near to the earth connection are two batteries, one in each branch, so joined up as to send their currents in the same direction. When the commutator is in motion it sends the current from the cable alternately through one or other branch. If it is a positive current which is sent into the left-hand branch, it meets a local current in the same direction, and the two are added; if into the right-hand branch, it meets an opposed local current, and is diminished or reduced to zero. Each positive current from the cable will, therefore, be audible in the telephone held to the left ear, inaudible in the right ear; the converse will, of course, take place with the negative currents from the cable, and the signals can be read in this way. In order to render the difference between the two currents more marked, the author proposes to use two commutators in place of one, each commutator giving out a distinct note; the high note will then be heard in one ear and the low note in the other. The effects of earth currents may be eliminated by using an opposed battery. Ordinary keys can be used for transmitting, but it is preferable to use keys which send a discharging current into the cable after each signal. The phono-signal may be used for duplex working. On account of its great sensitiveness, cables of smaller section may be used, thus greatly reducing the first cost.

Mr. H. A. Cleverly, Philadelphia, has taken the management of his city for the Eco Magneto Watchman's Clock which was illustrated and described in the last issue of the REVIEW.

Manufacturing Notes.

A number of detailed improvements that enter into the use of electric light fixtures and globes are being manufactured by that well known company, E. P. Gleason & Co., of 189 Mercer street. Mr. E. F. Gennert, who is superintendent of the electrical department, is a wide-awake young man, whose circle of friends in the electrical field is constantly increasing.

Chas. L. Ireson, 97 High street, Boston, has just completed one of his "Patent Self-Adjusting Leather Link Belts," for Seth F. Dawson, leather board manufacturer, Lawrence, Mass., which is undoubtedly the largest leather link belt ever made in the world. It is 76 feet long, 32 inches wide and weighs 780 pounds. It required 106,775 leather links to produce it.

A treatise on "Leather Link Belting for all Electrical Purposes," has just been issued by Mr. Chas. L. Ireson of Boston. It is very handsomely printed and illustrated, and will be sent gratuitously to those installing electrical apparatus. Interesting facts and figures relating to this class of belting is given by Mr. Ireson in this work, and all users of belts will find it a book that they should have.

Cowles' patented fire-proof and weather-proof electric light line wire is so well and favorably known by the large class of electrical users that it is scarcely necessary to say anything about its value here, but we take pleasure in calling attention to the very attractive descriptive circular with strong testimonials, just issued by the Ansonia Brass and Copper Company, sole owner of the Cowles' patent. This neat little publication will find a welcome from all electrical people, and carries within its covers convincing testimony as to the excellence of this fire-proof and weather-proof wire.

Messrs. E. S. Greeley & Co., New York, are engaged in laying submarine cables for the signal service, connecting Martha's Vineyard with Massachusetts' coast. Six and three-fourths miles of two-conductor cable and one and one-half miles of one-conductor cable are to be laid, the cable coming from the Silvertown Works, England. Col. M. W. Goodyear, the expert diver, has charge of the work, and departed for the scene last week, armed with a cutlass for keeping off the sharks and devil-fish that he feared might interrupt his submarine labors. As the colonel is more at home with water than any other fluid, his friends have no fears for the result.

Messrs. Chas. A. Schieren & Co., 47 Ferry street, New York, have issued the following notice relative to their "Electric" leather belt which is now widely and popularly known to the electric lighting public. "Information has reached us that attempts have been made to imitate our celebrated Electric leather belting, and we take this opportunity to inform our patrons and the trade generally that we have the exclusive right to use the word "Electric" as applied to leather belting. This right is granted us by registration in the Patent Office of the United States of America, dated November 17th, 1885, and number 12,785, and we hereby notify infringers that they will be prosecuted according to law. All of our Electric leather belting is stamped every ten feet."

Mr. Whipple Complimented.

At a meeting of the special committee appointed by the Common Council of Detroit, Mich., to examine and report upon the feasibility of the city owning and operating its own electric lighting plant, the following resolution was offered: By Alderman Burt:

Resolved, That the thank of this committee be, and they are hereby tendered to Mr. Fred. H. Whipple, secretary of the committee, for the very able, exhaustive and comprehensive manner in which he has discharged the laborious duties assigned to him, in preparing and compiling the information and facts connected with the subject relegated to the committe. We consider his work, as completed, to be beyond all question the most valuable digest of the matter that has ever yet been produced, and cheerfully recommend it to all who are interested in the subject of municipal lighting.

Adopted as follows:

Ayes—Ald. Burt, Meier, Trombley, Holihan, Amos.

Nays—None.

The Telephone Situation at Evansville, Indiana.

The telephone exchange here is operated by the Cumberland Telephone Company, with headquarters at Nashville, Tenn. About one year ago the telephone people decided to dispense with the night service, as they could not furnish both day and night service at three dollars per month. (This is the rate fixed by the State Legislature.) The company at that time had about 500 subscribers. After this decision of the telephone company, about one-half of the subscribers ordered their instruments removed. Night service was discontinued, however. This created great dissatisfaction. The matter was finally brought before the City Council. The Council, after discussing the matter for several weeks, ordered the telephone company to remove their poles and wires from the streets. This the company declined to do. The Council ordered the wires cut. This order, after being executed, created a great commotion. The exchange was closed, and the city was entirely without telephone service. The telephone company immediately brought suit for damage against the Councilmen and others who had taken a part in cutting the wires. They received judgment for a small amount.

Several attempts were made to introduce a different telephone, but none were successful. The city was without telephone service for about nine months. The company then decided to reopen their exchange and run it on the toll system.

At this time there are about 100 subscribers. I do not think the exchange will increase much more until the State Legislature meets, when an attempt will be made to repeal the telephone law.

Evansville, Ind., June 16. S. W.

A Western Union Dividend.

The directors of the Western Union Telegraph Company met last week and declared a quarterly dividend of 1¼ per cent., payable July 15.

A statement submitted to the meeting estimated the net revenues for the quarter ending June 30, at $1,350,000, an increase of $300,000 over the corresponding quarter last year. The surplus was given as $7,456,887, an increase of $846,455.

An Electric Storage Suit.

A. J. Carr and Baldwin, Davis and Wight, counsel for the Accumulator Motor Company of New Jersey, have filed in the United States Circuit Court at Baltimore a bill against the Electric Storage Company of Baltimore, James R. Clark, president, and A. B. Proal, secretary and treasurer, for an injunction and account. The facts, as alleged in the bill are that Camille A. Faure of France, was the inventor of a certain new and useful improvement in storage batteries, and to him a patent of that invention was issued. Faure subsequently assigned the patent to John M. Pendleton, of New York. Pendleton afterwards assigned it to the plaintiff. He charges the defendant with the infringing of his patent, etc., and prays for an injunction and statement of account. Judge Morris passed an order for the defendants to show cause why the injunction should not be granted on or before June 22, and fixing the motion for the hearing of the preliminary injunction on the 28th of this month.

Electricity at the Ohio Exposition.

Professor W. J. Hammer, the electrical expert, is enthusiastic over the progress of his work. He says he will show some electrical devices that have never before been created, and which will astonish the visitors to the Centennial. Flashing lights will gleam behind the dashing waters of the cascade, there will be a fountain suspended by a single wire, the walks will be bordered with changing lights; sprays of electrical bulbs will gleam up from great vases of flowers—there will be lights, lights, everywhere blinking and gleaming, and flashing, now brightness here and darkness there; then a total eclipse for a second, then a flood of light. A gorgeous electrical rainbow will appear and disappear over the miniature Niagara. This marvel in mechanics that Professor Hammer is fathering will astonish the natives.—*Cincinnati Times-Star.*

Telephonic News

*** All telephone service in Milwaukee, Wis., was suspended for a time, June 14th, a violent electric storm affecting the wires. The police and fire alarm and electric lighting wires were also damaged to some extent.

*** No great improvement—Edison's agent—"Wouldn't you like to buy a phonograph? It will store up everything you say and repeat it to you. Want one?" Omaha man—"No; got a wife."—*Omaha World.*

*** The *Home Monthly* truly remarks: "The ELECTRICAL REVIEW comes bristling all over with electrical news each week. The new inventions are explained and illustrated, and to those interested in this branch of science it is the right publication to read."

*** Upon the application of the Staten Island Telephone Company, Judge Andrews of the Supreme Court has granted an injunction restraining the Richmond Light, Heat and Power Company from interfering with the posts, wires, or right of way of the plaintiff company.

*** Thomas A. Edison, the inventor, has requested the privilege of heading the subscription list to rebuild the burned Presbyterian church at Milan, O., his old home. One resident will give $1,000 and it will cost the "Electric Man" at least that sum, but he can afford it.—*Toledo Blade.*

*** The telephone war in St. Louis continues unabated, and Mayor Francis shows no disposition to yield a single point to the Bell Company. The company has already taken out 151 instruments. A proposition to refer the dispute to the courts has been met with a flat refusal on the part of the mayor, who announces his determination to have the poles and wires taken down unless the company complies with the ordinance reducing the rental of an instrument from $100 to $50 per annum.

*** "Say, I'm going to move to-day, and I'd like to have you send a man and change my telephone to the new place right away," said a corpulent man who had wearily climbed two pair of stairs in Exchange place and poked his head into the central telephone office. "All right," said the superintendent, "it shall be done at once (the door is being closed). But why didn't you ask us by telephone?" "By thunder! I never thought of it," said he, and as the corpulent man descended the stairs it sounded as though he kicked himself at each alternate step.

*** The annual meeting of the Erie Telephone Company was in New York, June 12, and James W. Bennet, Charles J. Glidden, Charles E. Adams, Francis Jewett, J. W. Pickering, Wesley A. Gove, A. C. Russell, J. A Weston, W. J. McKinney, Levi Sprague and Harvey A. Whiting were elected directors. The last-named fills the vacancy caused by Mr. C. I. Hood's resignation. Charles J. Glidden was re-elected secretary and treasurer, Charles A. Grant transfer clerk, and J. P. McKinstry general manager. At a subsequent meeting of the directors the election of a president was deferred.

*** A despatch from Baton Rouge, La., says: "Mr. Granville B. Shaw, member from Vermillion, yesterday gave notice that at some future day he would introduce a bill in the House relative to telephones in this State. The bill has been expected, for during the session of 1886 it was one of the hardest fought measures before the House. The bill, with a few exceptions, is identical with the bill introduced in 1886. Instead of the monthly rental of one telephone being $3, the figure is now fixed at $3.50; for two telephones the price in the bill is fixed at $3 each instead of $2.50 as was in the old bill. The bill will be introduced in a few days and the success or failure to pass the House will be watched with considerable interest."

Mr. Wm. R. Trigg, president of the Richmond Locomotive and Machine Works, has been elected president of the electric railway of Richmond in place of Mr. J. T. Brown, resigned.

The report of the Richmond Union Passenger Railway for the month of May—No. miles run, 50,430—passengers carried, 242,282. The total operating expenses, including everything, was only 47 per cent. of the receipts.

The success of the Sprague electric road at Richmond, Va., is attracting much attention from street railway companies of the country. This road is operated at a decided saving over horse railways, and that under the most severe difficulties.

The Sprague Company have just sold one twenty and one thirty horse-power motor to parties in Nebraska, to be used in operating machinery for making brick. This is the first application of this nature, so far, made with such large motors.

The Naumkeag Street Railway Company has ordered motors from the Sprague Electric Railway and Motor Company to fit out six cars. The Salem (Mass.) Electric Light Company will furnish the power, and the wires will be run to the Willows on its poles. It is agreed that everything shall be in running order by July 10, and the system will be thoroughly tested through the summer and fall and the coming winter. If satisfactory through the winter, the company will adopt the motor for its entire road and branches.

Messrs. Chadbourne and Hazelton, Philadelphia agents for the Sprague Electric Railway and Motor Company, report business rushing and daily on the increase. They have lately placed motors in Wilkes-barre and York, Pa., and have just installed a motor for driving a large number of fans in the Columbia House, Chester, Pa. Messrs. Guigley and Mullen, wholesale grocers, at Wilmington, Del., have just started up a new five horse-power Sprague Motor, running a Morse & Williams Elevator, in their new five-story warehouse, and are so pleased with it they expect to put in another to operate a second elevator. They also report several street railways that are contemplating the adoption of the Sprague system.

A delegation of New York and Brooklyn street car officials last week made a thorough investigation of the workings of the Observatory Hill Electric Railway in Allegheny City. The party consisted of President D. E. Lewis, of Brooklyn; Superintendent Moore, of the Sixth avenue line; President A. Raymond, of the Fulton street line; S. B. Chittenden, of the Brooklyn Heights road; Superintendent W. H. Delaney, of the Fulton street line; Howard Constable, President Foster, of the Forty-second street line; A. J. Hutchinson and F. W. Child. Mr. Delaney, who is an electrical engineer, stated that the 12½ per cent. grade at the base of the hill was not only the steepest grade ever ascended by an electric car, but was really equal to a 16 per cent. grade owing to the sharpness of the curve.

Thomson-Houston Electric Railway System.

The electric motor is gaining ground in all directions. In the following cities roads are now in operation under the Thomson-Houston-Van Depoele patents: Ansonia, Conn., 4 miles; Appleton, Wis., 4.50 miles; Binghampton, N. Y., 4.50 miles; Detroit, Mich., 2 miles; Fort Gratiot, Mich., 1.75 miles; Jamaica, N. Y., 10 miles; Woonsocket, R. I., 4 miles; Revere, Mass., 4.50 miles; Montgomery, Ala., 11 miles; Port Huron, Mich., 4 miles; St. Catharines, Ont., 6 miles; Scranton, Pa., 5 miles; Wheeling, W. Va., 5.25 miles; Windsor, Ont., 1.75 miles; Lima, Ohio, 4 miles; St. Paul, Minn., 10 miles. And the following using Thomson-Houston motors: Alleghany City, Pa., 4 miles; New York, N. Y., 1 mile. The following are in process of construction: Wichita, Kan.; Dayton, Ohio; Omaha, Neb.; Scranton, Pa.; Chattanooga, Tenn.; North Adams, Mass.; Revere, Mass.; Salisbury, Mass.; Syracuse, N. Y. Total number of miles in operation, 82.25. It is claimed that 46 per cent. of the electric railways in the United States and Canada use the Thomson-Houston system.

ELECTRICAL ENGLISH NOTES.

(Special Correspondence.)

In the matter of coast telegraphs, Lord Onslow's bill to grant powers to Lloyds' shipping agency to obtain land for coast signal stations is not likely to pass unopposed. In a letter to the *Times*, Mr. R. Bagley, of Plymouth, points out that the work is of a kind which should be taken in hand by the government instead of by a private firm, and that some complete system should be installed which would, at the same time, provide for efficient communication between lightships and life-boat stations.

In Denmark, all the life-boat and rocket stations are connected by telephone lines with the telegraph system, and the instruments may be used by the public for a small charge. In some cases the keepers at the light-houses act as telegraph clerks and wire news of each ship that passes. If this has been done in Denmark, much more should we expect to find an efficient system along the coasts of England, more especially along the Channel, where the traffic is so great and ship-wrecks of such frequent occurrence. Moreover, in time of war, early information as to the movements of the enemies ships would be of the greatest importance from a military or naval point of view. If the work is allowed to drift into the hands of Lloyds or of any private firm, the chances of its being subsequently carried out on a broader basis will be seriously diminished.

LEFT IN DARKNESS.

Last Sunday night the stokers at the Grosvenor Gallery central lighting station, suddenly struck work for some trivial reason, and all the lamps on the system went out. The feelings of the engineer in charge, on being left stokerless on a Sunday night, can better be imagined than described; so probably can his remarks. No doubt gas will have a good deal to say about the threads upon which electricity without storage depends. But it is not so very long since the London Gas Company nearly got "left" in the same way, and gas retort stokers can not always be replaced next day like boiler stokers.

A NEW DYNAMO.

Mr. W. M. Mordey is bringing out a new and ingenious alternate current dynamo. Its output is about 40,000 watts, and is intended for an E. M. F. of 2,000 volts. It is entirely novel in design, and its main advantage over other forms lies in the fact that all the pole-pieces of the field magnet on the same side of the armature are of the same polarity, so that there is absolutely no magnetic leakage from one to the other. The field magnet revolves while the armature remains stationary, and, therefore, in constructing the latter it is unnecessary to provide for any great mechanical strength to prevent the coils from flying out, as they are liable to do in big machines with revolving armatures. They need only be fixed in tight enough to resist the tendency of the field magnet to drag them round, so the difficulty of insulating them is considerably reduced. The machine is to be protected from external injury by a sheet-brass cover. The E. M. F. remains very nearly constant with changing current, and any slight adjustment that may be necessary is to be effected by a small variable resistance, and not by any automatic regulating device.

THE SOCIETY OF TELEGRAPH ENGINEERS.

At a recent meeting a rule was announced limiting the time allowed to any one member for making his remarks during the discussion of a paper to ten minutes. It is to be feared that although in some cases this rule may prevent members from wasting their breath, the "best part of the paper," as the proverbial Irishman would have remarked, is often the discussion which follows it, and that men who really know their subject will find it hard to get through all they have to say in so short a time. Take for instance the question of Transformers *v.* Accumulators. What would Mr. Crompton's paper have been without the criticisms by Messrs. Kapp and Preece and other veterans which followed it. All of these speakers detained the society considerably over the limit of time now fixed on.

The last paper read before the society was by Professor Silvanus Thompson on the history of the Influence Machine during the past century. It was of scientific rather than commercial interest, and forms the fourth of his series of "histories." The telephone and the incandescence lamp have both had their stories written by him, as well as the mercurial air pump.

FREAKS OF LIGHTNING.

There was a big thunderstorm in the north a short time ago. Near Glasgow two men who were walking along a road were both struck down by a flash of lightning. One was killed and the other received a slight shock, but is said to be none the worse. Three boys were sitting in a row on the grass near the town, when a flash of lightning came and killed two of them, leaving their companion, who was sitting in the middle, uninjured. It is to be hoped that he was the good one. If so, here are the materials for an excellent moral tale.

INCANDESCENCE LAMP PATENTS.

The hearing of the case between the Brush Corporation and the Swan Edison Company has been going steadily on since the middle of April, and Mr. Justice Kay seems to be about as near a decision as on the day when it began. Owing to the opinions of many of the witnesses being directly opposed to one another, it has been decided to make some experiments which will be watched for each side by six experts. A report will afterwards be made by an independent witness. Some of these experiments will be tests as to the lasting power of the lamps, and it was at first objected that this would take too long, but, as the judge remarked, they will probably have very long lives if they last as long as the case.

London, June 8. G. H.

New Alternating Dynamos.

BY R. KENNEDY.

The remarkable rapid progress made by the system of distribution of electricity by alternating currents and transformers both in America and Europe has turned the attention of the leading electrical engineers to the improvement of the alternating dynamo machine and transformers.

Transformers are such simple affairs that no interesting improvement can be made in their design, but the dynamo lends itself readily to a great variety of different designs, and can be arranged in its parts in many ways, although all of them contain the same simple essential features. The new arrangements recently brought forth may be classed into two divisions—first, those with iron cores in the armature; and secondly, those without iron cores; these divisions divide again into two classes, machines in which the armature poles are alternately reversed in polarity, and machines in which the armature is magnetized and demagnetized alternately without reversal.

In considering the applications of alternating dynamos it is very essential to classify them in the above manner, because they do not all behave alike in some important particulars. The most recent dynamo publicly described is the Mordey dynamo, which has a field magnet of new design built on the "ironclad" principle, a principle of design which was first suggested by Mr. Kapp as applicable to dynamos, and which has been applied to continuous current dynamos by many makers.

The field magnet is a cast iron shell with a nearly closed magnetic circuit, the only break in the circuit being a narrow cut in which the armature coils pass through the magnetic field; these fields are not alternately reversed, they are all similar, and therefore to obtain the induction of alternating currents in the armature coils, one-half of the coils are gaining magnetism while the other half are losing magnetism; this is brought about by making the armature coils double in number to the magnetic fields. All the poles on one side of the armatures are of N, and all the poles on the other side are of S polarity, and these poles are obtained by one exciting coil enclosed by the field magnet ends. This coil is of simple cyclindrical form, and therefore is of the best shape and in the best position to withstand rapid revolution; in fact, this field magnet is mechanically and magnetically very superior; it would seem, however, to be a rather difficult job to make such a field magnet of wrought iron, but that remark might be made about all forms of magnets for large alternating dynamos.

The field magnet is really the novelty in this machine. Ironclad alternating dynamos are, however, not a novelty. The author has an ironclad dynamo which has run continuously since November, 1886, distributing alternating currents over a two mile circuit, supplying two shops with 80 lights through a transformer. This machine may be seen at work any day by calling at the Belt Works in Cumberland street, Glasgow; the shops lighted from it are at the Glasgow Cross.

In this machine the magnets are fixed and the armature rotated. All the poles are of N polarity on one side of the armature and all the poles on the other side are of S polarity, and all the poles are obtained by the use of two plain circular coils laid into a cast iron shell forming a nearly closed magnetic circuit; one coil is sufficient, but it is divided into two for convenience of handling.

In Mordey's machine the poles of the field magnets on opposite sides of the armature are directly opposite each other, and must be so, as he has no iron in his armature.

In the author's machine the poles are not directly opposite each other, but the poles on one side are opposite the spaces between the poles on the other side, and this must be so because iron is used as a core in the armature coils. This explains all the difference between the two dynamos; in the one no iron is in the armature, and in the other iron is used very largely, and hence the different disposition of the magnetic fields.

Iron is used in the armature of an alternating dynamo for a very particular purpose.

Dynamos at a central supply station must be run in parallel connection with each other, and the best arrangement seems to be to have a number of moderately sized dynamos driven direct from independent engines by good belting. By adjusting the speeds closely, alternating dynamos thus driven are found to work well in parallel connection; they fall into steps suddenly, maintain the same phase, and continue to work together; this they do all the more readily if plenty of iron is used in the armature cores. In fact, armatures without iron in the cores of the armature are difficult to bring into the same phase, and very easily thrown out of phase again; at least that is the author's experience, and the experience of a few others who have made the experiment.

Perhaps in the Mordey machine this difficulty does not exist, considering that the poles are not alternately reversed; at any rate the adoption of iron in the armature surmonts the difficulty. Flat ring or disc armatures containing iron cores have another difficulty when made of large diameter and placed between two sets of powerful poles, and that is the tendency to bend over and strike the poles of the field magnets, more especially if the armature is the rotating part of the machine.—*London Electrical Review.*

—— Electric Lighting is growing in great popularity in Newport, R. I. The Edison Electric Light Company is wiring the Casino, Newport reading room, and many private residences including those of J. N. A. Griswold and Isaac Bell, Jr., preparatory to putting in incandescent lights. The Newport Incandescent Electric Light Company is pushing its business with satisfactory results, and its plant is operated by electrical accumulators.

Against Execution by Electricity.

May not the consequence of inflicting painless death for crime, a consequence slow to arrive and at first unperceived, be a deadening of the natural and most beneficial horror of inflicting death too readily? The new philanthropists will smile at us, and say the dislike to the penalty of death is increasing everywhere; but if they were accessible to argument we could show them reasons for doubting that conclusion. The tendency to war does not decrease, though the habit of preaching against it increases, and if it lasts, the dislike of capital punishment for adequate reason cannot long survive.

The dislike exists for this one moment out of all the ages, Christian ages as well as pagan; but though mankind is not wise, it is too absurdly illogical, considered by itself, to keep its place long in the thoughts of men. It involves, under the theory now, for example, rampant in Italy, this preposterous assertion, that while there is no sacredness in human life as such, while it is noble to shoot an ignorant conscript who, under the compulsion of discipline, invades your country, and justifiable to shoot the soldier who will not invade another country when he is ordered, there is a sacro-sanctity in life if only it is criminal and noxious. The mutineer must die, but the murderer must be spared; it is a duty to slaughter out an invading regiment which may slay and burn, but wicked to slaughter the miscreant who has burned or slain.

There can be no future for an idea so essentially silly as that; and when it passes away, there may come from the reaction from it, an undue hardening of the general heart. The impulse of the day is to be oversoft; but the tendency of thought, which will outlast the impulse of the day, is towards adamantine hardness, towards, that is, the scientific view of things—the view which suggests that death is not only the most deterrent of all punishments for crime, but the one least embarrassing to the innocent community, and most certain to prevent the hereditary descent of criminal instincts.

If there is no knowledge save scientific knowledge, Plato was right when he sentenced all misshappen babies, and it would be hard to answer Mr. Cotter Morrison's terrible suggestions as to the prevention of any accumulation of criminal proclivities. On what scientific principles, for instance, should the irreclaimable criminal, or the pauper lunatic, tax the community for years to support his noxiousness.

The doctrine of euthanasia for criminals will be preached—indeed, is preached in some quarters already, and it may yet find acceptance in those new societies where the only ideal that really prevails is the ideal of comfort on this earth and for all men. If such a generation arises, or if the hearts of men approximate toward the hearts that such a generation would possess, it would be found that with the practice of killing only by coarse and painful methods, revolting even to those who, like ourselves, deem capital punishment indispensable, a great restraint on killing had disappeared.

To slay painlessly, without fuss, without bloodshed, without disfigurement of the human frame, would seeem so very easy, and comparatively so little shocking. There are very few men, however brutal, who would no sooner order a hundred men to be fusiladed out of sight than a hundred men to be separately hanged before them; and execution by electricity, involving as it does no pain, is far less brutal even than fusilading. Suppose all the irreclaimable convicts in London executed in silence, secretly, with no possibility of pain, would the announcement of the fact create half the repugnance which the execution of one criminal does now?

Capital punishment is just; but something to make the judge and juryman reflect, to make him fear for his own responsibility, to make him search his conscience, in theological phrase, is an indisputable check; and in abolishing pain, and the knowledge of details, and personal action in executions, we, to the extent of human power, take that check away. It is foolish to assert that this would not be the case, or that men would not be equally moved by the bare record of the number of deaths.

Who is moved by the registrar general's weekly return or the return of deaths in a convict prison? Do you suppose that Mary Tudor's martyrs, dying invisible, without pain, without report save that they were dead, would have shocked London into Protestantism? They would have passed, as even now convicts sentenced to labor for life pass, to their doom unheeded, except by the few who make their destinies a study.

It is human instinct which in all countries has prohibited poison as a means of executing ordinary criminals, and has compelled rulers to let supreme justice be done in methods of the very coarseness and brutality of which force legislators and judges and juries to consider painfully what they do. The guarantee against laxity in inflicting death, and, therefore, against a brutalization of society, is that very sympathetic horror, that pain in the hearts of the innocent, which the legislature of New York, in its hungry pursuit of happiness, is calmly legislating away.

It is not making laws in order that criminals be not hurt, for convicts have no votes. Its object is to reduce the pain of the society inflicts, not of the criminal who suffers death; and in reducing it, it is reducing that society's care to have its conscience clear. "What matters if he died? He was a criminal, and he died painlessly." That will be the real state of public feeling; and while we advocate the death penalty as the supreme deterrent, justified by the right of society to inflict adequate vengeance for wrong-doing, we hold that state of feeling to be at once dangerous and bad.—*London Spectator.*

Trial Trip of an Electric Boat made in this Country.

A company of gentlemen, in response to an invitation tendered by Messrs. Anthony and Frederick Reckenzaun, took a trip up the Passaic, last week, in the electric launch "Magnet." The object of the trip was to inspect and watch the working of an electric motor in propelling a vessel. It was something unusual to see and feel a boat propelled without the motive power being visible in any of the forms which accompany the use of steam. There was no smoke, no steam, no fire, no noise, no smell, in short, nothing to discommode or to detract from the pleasure and comfort of a sail. The little vessel appeared to be shoved along by invisible hands. People on shore, and in the various craft passed on the river, gazed in mute astonishment at a boat moving along swiftly without the semblance of machinery anywhere in sight. A halt was made at Ripper's, above Belleville, where refreshments were partaken of, and then the party returned, gliding down with the tide at the rate of ten miles an hour.

The "Magnet" is 28 feet long, six feet beam, and three feet deep, and has decks fore and aft six feet long. Her propelling apparatus consists of one Reckenzaun electric motor, 50 accumulator cells of the "25 C" type, manufactured by the Electrical Accumulator Company, of New York city. She has a gun-metal two-bladed screw, 18 inches in diameter. These cells, after being fully charged, are said to be capable of giving off electrical energy equivalent to about 22 horse-power. The total weight of the accumulators and motor is 300 pounds. The motor is controlled by one switch, the starting, stopping or reversing, being effected by the simple turning of a lever one way or the other.

A speed of 12 miles per hour can be obtained going with the tide. There is no danger of explosion nor is there the slightest danger of receiving a shock; the entire apparatus is concealed, and even were it exposed, any part of the electrical arrangement could be touched by a child with absolute safety.

The "Magnet" is charged by a dynamo of the Electrical Accumulator Company's factory, the charging current passing through about 1,500 feet of wire, connecting the dynamo with the boat. The "Magnet" has eight 10 candle-power incandescent (electric) lamps, any or all of which can be turned on at will. Several electrical propelled launches, partly pleasure boats, partly auxiliaries to vessels of navies, etc., have been constructed in Europe, but the "Magnet" is the first successful boat of this class carrying the American flag. The hull was built by G. H. & G. S. Seybolt, of Newark. The boat, with propelling apparatus, electric motor, accumulator cells and electric lights, costs about $1,600.

Electric Coal Mining Machine.

A new coal mining company, known as the Electric Motor Company, which has a patent for mining by electricity, will establish a plant at Phillipsburg, Pa., for the mining of an area of ten miles. The plant, as a whole, is to consist of a central dynamo, conducting wires, coal-cutting machine, electric lamps, and motor attachments for hanging the mining cars.

The inventors claim, as an advantage in favor of their coal cutters, that a single machine will not weigh more than 500 pounds. According to estimates, which, it is claimed, are made upon actual tests, the new device will considerably reduce the expenses of mining, which has proved so costly with existing methods of transmitting and applying power by steam or compressed air.

The Underground Conduit in Boston.

Henry E. Cobb, Royal M. Pulsifer and Francis R. Chapman have accepted the franchise granted them by the Board of Aldermen for the exclusive right of the streets of Boston for twenty years in which to place conduits for carrying telegraph and telephone wires, and have filed a bond in $200,000, with Patrick Meehan and Azariah F. Crowell as sureties. The aldermen will be asked to grant locations, but how soon work will be begun is uncertain, as Mr. Cobb is away, and the mayor may not grant permits.

—— When the application of the Penn Electric Light Company for privileges came before a committee of Councils in Philadelphia, the question as to the right of a foreign corporation having no charter from the State of Pennsylvania to obtain privileges in the city was raised, and discussed at some length. The Penn Company is a New Jersey corporation. Action on its application was postponed.

—— The Allegheny, Pa., Gas Committee had an informal discussion on a project for lighting the city by electricity. Superintendent Hunter presented a map of the city, showing how the city could be lighted with electricity by a combination of towers and poles. The committee, many of whom were on the recent trip to investigate electric lighting, were in favor of using masts only, and quoted Detroit as the best-lit city in the world.

—— The Brooklyn Electric Light and Power Company, operating the Loomis system, is asking for a right of way on certain streets of Brooklyn, and declare its readiness to use underground conduits. The names of the gentlemen composing the Board of Trustees are Andrew B. Baird, president; Franklyn Coit, Messrs. George Ricard Conner, Bernard Peters, John T. Runcie, Richard G. Phelps, Lewis R. Stegman, Noah L. Cocheu, all of the city of Brooklyn; and Thomas Black, of the city of New York.

—— Messrs. Hyer & Montgomery, of 15 Cortlandt street, representing the Heisler system of electric lighting, have contracted with the Johnstown Electric Light and Power Company of Johnstown, N. Y., to supply a 500-light (30 candle power) incandescent machine for commercial lighting, the dynamo to be run by water power, 2½ miles distant. The circuit of lights will be 23 miles long, lighting four towns. They have also contracted with the Greenpoint, L. I., Company for a 225 lighter, for street and commercial lighting. These gentlemen are pushing the Heisler system in the East with much energy and the success that follows.

—— The Panama Electric Light Company which has lighted Colon satisfactorily for the year past, and has a concession from the government for lighting the city of Panama, is actively engaged in the preliminary arrangements for the introduction of the electric light there. Mr. Chas. W. Grant, an electrician of the Thomson-Houston Electric Co., of Boston, has arrived on the Isthmus to superintend the erection of the plant. The bulk of the machinery is already on the ground. One arc dynamo, for the outside lights, and one incandescent dynamo to carry 1,000 lamps on the alternating system, for the inside lights, will be used. The company will start with 45 arc lights in the streets of the city. Almost 400 incandescent lights, for inside purposes, have already been engaged.

ELECTRIC LIGHT NEWS

—— Mt. Vernon, Ohio, is to be lighted with 74 arc lights.

—— An electric light plant will be erected at Louisville, Ky., by W. F. Norton.

—— The Hauss Electric Lighting Company suffered a loss of $2,500 by fire in Cincinnati, last week.

—— The Electric Light Company, of Gainsville, Ga., is organized, and preparations are going on to have the lights turned on by July 1st.

—— The Newark, N. J. Electric Light Company's contract for electric light will expire soon, and proposals will be wanted to continue the service.

—— J. Warren Tibbetts, chairman, is asking for sealed proposals, until June 27, for lighting the city of Ithaca, N. Y., for the terms of 3 and 5 years.

—— The city of of San Francisco, Cal., has appropriated $245,000 for public street lighting, and $18,000 for fire alarm and police telegraph system.

—— J. R. Petrie, electrician of the Virginia Electric Light Company, has charge of the electric plant being put in the Chollar mine for transmission of power.

—— The City Council of Newport, R. I, has voted to continue the present city contract for electric lighting for 18 months. This settles the question until January 1st, 1890.

—— Governor Hill vetoed the bill granting a franchise to the Edison Company in Brooklyn, on the ground that Brooklyn should attend to such matters without State interference.

—— Hempstead, L. I., is to be lighted by electricity as soon as details can be fixed. A company has been incorporated with a capital stock of $75,000. John Moore can furnish details.

—— The town of Sumter, S. C., is contemplating the lighting of the town by electricity. H. D. Gardner, civil engineer there, says that twenty-five lights of 200 candle-power will be required.

—— The Rome, Watertown and Ogdensburg R. R. are putting in a large Okonite cable for crossing the Genesee river at Charlotte, for the Thomson-Houston system of electric lighting, which they have adopted.

—— The Thomson-Houston system is giving great satisfaction in Oakland, Cal. June, 1887, they were operating 100 arc lights, now they are furnishing 200, and have ordered additional apparatus that will enable them to enlarge the plant to 600 arc lights.

—— The Kent laboratory at New Haven had a narrow escape from destruction by fire last week. The fire was caused by the explosion of a gaspipe. Driver Goebel, of the fire department, extinguished the flames before any damage was done beyond blackening the ceiling.

—— The Gloucester, N. J., Electric Light Company, which was formed last month, have started with a 75 light American Dynamo. The business has been so prosperous that they have ordered the Philadelphia agent of the American Company to duplicate the first order and ship the increase of apparatus at once.

—— The Waterhouse Electric Company, through their Cincinnati representative, W. A. Gray, have placed a 30 light plant, in the picnic ground known as the "Coney Island of the West," near Cincinnati, and have also sold a plant to the Ohio Penitentiary at Columbus, Ohio, the latter to be used principally for lighting the space just inside the wall, to assist the guard in preventing escapes.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JUNE 12, 1888.

384,271 Electric pendulum clock; Albert L. Parcelle, New York, N. Y., assignor to the Manhattan Clock Company, of Colorado.

384,289 Automatic switch for secondary batteries; John S. Sellon, Hatton Gardens, County of Middlesex, England, assignor to the Electrical Accumulator Company, of New York.

384,320 and 384,322 Printing telegraph. 384,321 Polarized electro-magnet. 384,323 and 384,326 Automatic pole changer. 384,324 and 384,325 Automatic telegraphy. Edward J. Mallett, New York, N. Y.

384,350 Combined telegraph key and sounder; John Doggett, Plain City, Ohio, assignor of one-half to Leonidous J. King, same place.

384,404 Machine for covering or insulating wire; Joseph D. Thomas, South Framingham, Mass.

384,430 Electrical annunciator; Hiram S. Downerd, Zanesville, Ohio.

384,440 Electric circuit controller; Otto F. Greim, Newark, N. J.

384,447 Regulating commutator for secondary batteries; Edmond Julien, Brussels, Belgium, assignor to the Julien Electric Company, New York, N. Y.

384,455 Printing telegraph received; Henry Mahnken, New York, N. Y., assignor to John Anderson, same place.

384,472 Electric winding attachment for clocks; Andrew J. Reams, Augusta, Kans.

384,476 Police electric signal system. 384,477 Multiple switchboard circuit. Charles E. Scribner, Chicago, Ill., assignor to the Western Electric Company, same place.

384,478 Incandescent lamp socket; John Spink and Charles Gauzentes, Bradford, County of York, England.

384,562 Electric railway; G. Herbert Condict, Philadelphia, Pa., assignor to the Electric Car Company of America, of Pennsylvania.

384,570 Electric circuit closing device; Milton W. Grovesteen and Frederick G. Jahn, New York, N. Y.

384,576 Electric railway; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Electric Car Company of America, same place.

384,580 Apparatus for electric traction. 384,581 Electric railway car. Edmond Julien, Brussels, Belgium.

384,594 System of electric locomotion; Henry A. Seymour, Washington, D. C., assignor to the Brush Electric Company, Cleveland, Ohio.

W. S. HILL,
133 Oliver Street, BOSTON, MASS.

DYNAMOS, ARC LAMPS, CUT-OUTS,
DOUBLE POLE SWITCHES,
KEY SOCKETS AND LAMPS.

William Marshall,
Manufacturer of Electrical Condensers.
STANDARDS A SPECIALTY.
Rooms 2 and 4 University Building.
Corner Waverley and University Places, New York.

H. E. & C. BAXTER,
Manufacturers of and Dealers in
Electrical Goods and Supplies,
18 FULTON ST., BROOKLYN, N. Y.

PATENTS.

Electrical Review Patent Bureau

Conducts a general business in the preparation and prosecution of Applications for Patents, in the United States and all Foreign Countries. All business carefully and promptly attended to in the matter of Reissues, Caveats, Trade Marks, Labels, Design Patents, Copyrights.

SPECIAL SEARCHES made to determine the question of novelty or infringement.

ELECTRICAL PATENTS A SPECIAL FEATURE. All business receives the direct personal supervision of the Manager, whose fourteen years' experience as Patent Attorney and seven years as Practical Electrician, insures thorough and satisfactory work.

All communications are strictly confidential, and inventors may address us with entire freedom.

Our charges will always be as moderate as first-class work will permit and commensurate with the amount of work to be done.

Address,
Electrical Review Patent Bureau,
13 Park Row, N. Y. T. J. McTIGHE, Manager.

O. K.

O. K.

Full Size!!!
NO ONE
Denies this to be the only safe automatic in the
LAND
Perfected
Improvements
Commend it to the Trade.
$6.00 EACH.
Discount (—).
A. L. BOGART,
22 Union Sq., N. Y.

WHY everybody interested in Electric Lighting should read "MUNICIPAL LIGHTING." A book of 250 pages, profusely illustrated.

Because it gives all desirable information about the subject of furnishing light.

It tells what systems are used; how they are operated; how the lamps and wires are strung; the area lighted; what the lights cost; the hours burned; the contracts, etc., in nearly every town and city in the country.

It tells all about municipalities that operate their own plants.

It tells how city officials, councils, mayors and others should investigate the subject.

It tells electrical manufacturing companies when public contracts expire.

It tells electricians and others what the underground wire question has developed.

In fact, it gives the alpha and the omega of the whole range of public lighting.

It Should be in the Hands of Everybody.

Councils that are discussing this question; mayors who want to write about it; city clerks who are instructed to procure information on it; newspapers who want to keep posted; electrical people who want to reach the patrons of electrical material; local light companies who want to know what their contemporaries are doing, should all read this book.

Send $1.00 for a copy to
FRED. H. WHIPPLE, Detroit, Mich.
Copies bound in Russia, $1.50.

Detroit Electrical Works
MANUFACTURERS OF
ELECTRIC SUPPLIES,
INCLUDING
Medical Batteries, Skeleton and Box Bells, Burglar Alarms, House Annunciators, Fire Alarm Boxes, Pins and Brackets.
Insulated Magnet, Telephone and Electric Light Wire.
GENERAL OFFICES and FACTORY:
DETROIT, MICH.

THE EMPIRE CITY ELECTRIC CO.
15 Dey Street, New York,
MANUFACTURERS OF
Telephone, Telegraph
—AND—
ELECTRIC LIGHT SUPPLIES.
WRITE FOR PRICES.

EUGENE F. PHILLIPS, President. W. H. SAWYER, Sec'y and Electrician.

American Electrical Works

PROVIDENCE, R. I.
MANUFACTURERS OF PATENT FINISHED
INSULATED ELECTRIC WIRES,
TELEPHONE & INCANDESCENT CORDS.
Electric Light Wire
Magnet Wire, Patent Rubber-Covered Wire, Lead-Encased Wire, Flexible Cordage, Office and Annunciator Wire.
Underground and Aeriel Cables.
New York Office: 18 Cortlandt St.
P. C. ACKERMAN, Agent.

E. P. Gleason Manuf'g Co.
BRASS IRON TIN GLASS
181-189 MERCER STREET, NEW YORK.
MANUFACTURERS OF
ELECTRIC LIGHT APPLIANCES, FITTINGS, INSULATED JOINTS, FIXTURES,
Globes, Shades, Fancy Lamps, &c., &c., &c.
SEND FOR CATALOGUE E. AND SUPPLEMENT.

THE BEST
Disque Leclanché Batteries
ARE THOSE MADE BY
J. H. BUNNELL & CO.
OVER 200,000 USED IN THE PAST FOUR YEARS. ALL GIVING ENTIRE SATISFACTION.
ASK ANY ONE OF THE MANY USERS OF THE SAME.
THE REASON WHY, is simply because our processes are the most perfect and our materials used in the manufacture are the very best selections that can be obtained.
Prices almost, but not quite as low as the ruling prices for inferior make.
Porous Cups, 35 cents, Subject to Discount in Quantity.
ONE OF MANY:—"WE ARE USING ABOUT 6,000 CELLS OF BATTERY ON OUR CIRCUITS, AND HAVE AS YET FOUND NOTHING EQUAL TO J. H. BUNNELL & CO.'S DISQUE LECLANCHE BATTERY. Yours, Resp'y, GEO. W. ADAMS, Supt. The Boston Electric Association."
J. H. BUNNELL & CO.,
106 & 108 LIBERTY STREET, NEW YORK.
Send for our LATEST CATALOGUE, No. 6, of JANUARY, 1888.